

PRELIMINARY REVIEW REPORT

Lockheed Martin Corporation, Missiles and Space Facility
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Prepared for:

U.S. ENVIRONMENTAL PROTECTION AGENCY
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1.0 EXECUTIVE SUMMARY

The first step in the Resource Conservation and Recovery Act (RCRA) corrective action process is the RCRA Facility Assessment (RFA). The RFA is conducted to assess if a release of hazardous waste or hazardous constituents has occurred from solid waste management units (SWMUs) at the facility. The main components of an RFA are to identify and gather information on releases at the RCRA facility (e.g., via file review); to evaluate SWMUs for releases to all media (groundwater, surface water, air, and soil); and to make preliminary determinations regarding releases of concern and the need for further actions and interim measures at the facility.

The U.S. Environmental Protection Agency (EPA), Region 9, contracted with Booz Allen Hamilton (Booz Allen) to conduct an RFA at Lockheed Missiles and Space Company, Inc. (LMSC), located in Sunnyvale, California. A preliminary review of file material on the site was conducted at the following agencies: EPA Region 9, California Regional Water Quality Control Board (RWQCB), California Department of Toxic Substances Control (DTSC), City of Sunnyvale Hazardous Materials Department, Santa Clara Valley Water District, and the Bay Area Air Quality Management District (BAAQMD).

This report outlines the findings of the preliminary file review and identifies areas where additional information is needed in order to make a determination on whether releases have occurred. Typically, a visual site inspection (VSI) is conducted after completion of the file review to fill data gaps identified in the Information Needs List. For this facility, EPA Region 9, the RWQCB (Region 2), and DTSC jointly determined that a VSI would not be required. Because a VSI was not conducted at this facility, unit-specific suggestions for further action are not included in this report. Per discussions with EPA, the RWQCB plans to oversee the collection of additional information on the vapor degreasers and waste transfer lines at the facility.

The LMSC facility is located on a 660-acre parcel in Sunnyvale, California near the southwest shore of the San Francisco Bay. The facility develops and manufactures missile and satellite components, primarily for military purposes, thus many of the operations at the facility are classified. Construction of the facility began in 1956, and operations started in 1958. The scope and size of LMSC's operations expanded throughout the Cold War era, but have decreased significantly over the past decade.

Processes that support LMSC's missile and satellite development operations include metal plating, etching and chemical milling, degreasing, spray painting, printed circuit board manufacturing, chemical processing, and photoprocessing. These operations

require the storage and use of acids, bases, metal solutions, solvents, fuel hydrocarbons, and small amounts of radioactive material. These processes primarily generate wastewaters, which are treated in the facility's Central Wastewater Treatment Plant (CWTP) and ultimately discharged to the San Francisco Bay following treatment at a local publically owned wastewater facility. In addition to hazardous waste treatment in the facility's wastewater treatment system, the facility also historically stored hazardous waste in tanks, containers, and surface impoundments. LMSC's past RCRA-regulatory status is outlined in Table 6. The facility is currently a large quantity generator (LQG) of hazardous waste.

Based on the review of file materials, 163 SWMUs and 10 areas of concern (AOCs) were identified at the site. The SWMUs and AOCs are organized according to building location at the facility, and are listed in Tables 1 and 2 below, respectively. SWMUs are numbered sequentially and by building number. For example, *SWMU 113-2: Former Neutralization Unit* is the second SWMU listed for Building 113. Numbers contained in brackets after the SWMU name indicate how many of that type of unit are in that particular building. For example, for *SWMU 071-3: Degreaser (1)*, the (1) indicates that there is one degreasing unit in Building 71.

Table 1: SWMUs	
Building No.	Identified SWMUs
14E/041	SWMU 14E/041-1: Former Spray Paint Booths (3) SWMU 14E/041-2: Former 14E Hazardous Waste Container Storage Area SWMU 14E/041-3: Former Underground Waste Oil Tank (WT14E)
071	SWMU 071-1: Plating Area (1) SWMU 071-2: Spray Paint Booths (4) SWMU 071-3: Degreaser (1) SWMU 071-4: Demineralizer SWMU 071-5: Hazardous Waste Tank (T-115) SWMU 071-6: Wastewater Tank (T-113) SWMU 071-7: Carbon Desorber
076	SWMU 076-1: Spray Paint Booth (1) SWMU 076-2: Degreaser (1)
102	SWMU 102-1: Former Underground Vault

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Building No.	Identified SWMUs
103	SWMU 103-1: Former Plating Area (1) SWMU 103-2: Former Degreasers (4) SWMU 103-3: Former Spray Paint Booth (1) SWMU 103-4: Former Plating Waste Tanks (WT103-1 and WT103-2) SWMU 103-5: Former Hazardous Waste Tanks (WT103-4 and RW103-5) SWMU 103-6: Former Waste Oil Tank (WO103-CO1) SWMU 103-7: Former Baker Tank
109	SWMU 109-1: Waste Oil Tank 109
113	SWMU 113-1: Degreasers (4) SWMU 113-2: Former Neutralization Unit SWMU 113-3: Hazardous Waste Tanks (WT113-1 and WT113-2)
114	SWMU 114-1: Former Andco Treatment Unit SWMU 114-2: Former Clarifier/Sludge Thickening Unit/Filter Press SWMU 114-3: Former Hazardous Materials Processing Unit (HMPU) SWMU 114-4: Former Cyanide Destruction Unit SWMU 114-5: Hazardous Waste Container Storage Area
130	SWMU 130-1: Former Degreaser (1)
132	SWMU 132-1: Former Solvent Waste Drums
136	SWMU 136-1: Spray Paint Booth (1)
138	SWMU 138-1: Former Steam Cleaning Unit
140	SWMU 140-1: Spray Paint Booth (1) SWMU 140-2: Waste Coolant Tank (WO140-1)
141	SWMU 141-1: Spray Paint Booth (1)
150	SWMU 150-1: Plating Area (1) SWMU 150-2: Spray Paint Booth (1) SWMU 150-3: Degreaser (1) SWMU 150-4: Former Waste Container Storage Area SWMU 150-5: Hazardous Waste Tanks (WT150-2 and WT150-3)
151	SWMU 151-1: Plating Area (1) SWMU 151-2: Spray Paint Booths (7) SWMU 151-3: Degreasers (11) SWMU 151-4: Hazardous Waste Tanks (RW151-1 and WT151-2) SWMU 151-5: Former Waste Chemical Storage Area

Building No.	Identified SWMUs
152	SWMU 152-1: Spray Paint Booths (2) SWMU 152-2: Hoist Sump
153	SWMU 153-1: Plating Area (1) SWMU 153-2: Spray Paint Booths (5) SWMU 153-3: Degreasers (7)
155	SWMU 155-1: Spray Paint Booth (1)
159	SWMU 159-1: Spray Paint Booth (1) SWMU 159-2: Hazardous Waste Tanks (WT159-8 and WT159-9) SWMU 159-3: Waste Oil Tank (WO159-4)
170	SWMU 170-1: Former Plating Area (1) SWMU 170-2: Former Spray Paint Booths (4) SWMU 170-3: Former Degreasers (2) SWMU 170-4: Former Waste Beryllium Tank (WT170-5) SWMU 170-5: Former Bag House Dust Area SWMU 170-6: Former Process Clarifiers (2) and Underground Sumps (4) SWMU 170-7: Former Storm Ditch 002 SWMU 170-8: Former Waste Oil Tank (WO170-WO) SWMU 170-9: Former Hazardous Waste Tank (WT170-3)
171	SWMU 171-1: Incinerator
174	SWMU 174-1: Spray Paint Booths (6) SWMU 174-2: Demineralizer
179	SWMU 179-1: Metal Wastewater Sump SWMU 179-2: Former Cyanide Destruction Unit SWMU 179-3: Baker Tank
181	SWMU 181-1: Spray Paint Booth (1) SWMU 181-2: Silver Retention Sump
182	SWMU 182-1: Plating Area (1) SWMU 182-2: Spray Paint Booths (8) SWMU 182-3: Degreasers (5) SWMU 182-4: Hazardous Waste Tank (WT182-2) SWMU 182-5: Former Air Scrubbers SWMU 182-6: Acid Retention Sump SWMU 182-7: Metal Process Waste Sumps (3)
183	SWMU 183-1: Degreaser (1)

Building No.	Identified SWMUs
187	SWMU 187-1: Waste Oil Tank
188	SWMU 188-1: Former Spray Booth (1)
195B	SWMU 195B-1: Spray Booth (1) SWMU 195B-2: Degreaser (1)
562	SWMU 562-1: Former Degreaser (1) SWMU 562-2: Former Wastewater Treatment System SWMU 562-3: Former Hazardous Waste Tanks (WT562-1 and WT562-2)
Surface Impound- ment Cluster	SWMU Cluster-1: Evaporation Ponds SWMU Cluster-2: Holding Ponds

All known plating operations, spray paint booths, and degreasing operations are identified as SWMUs for the purposes of this report. Other units listed above appear to have routinely and systematically discharged waste to the environment based on information in the facility file.

The seven AOCs include areas where contamination from product tanks, process operations or spill events was identified in the file material.

Table 2: AOCs	
Building No.	Identified AOCs
104	AOC 104-1: Soil Contamination Area 1 AOC 104-2: Soil Contamination Area 2
109	AOC 109-1: Former Underground Storage Tanks (USTs) (4)
166	AOC 166-1: Former Automotive Service Station
186	AOC 186-1: Leaded Gas UST
Storm Ditch 001	AOC 001-1: Storm Ditch 001
Various	AOC WTL: Waste Transfer Lines

Figures are contained in Appendix A. Data gaps are presented in the Information Needs List contained in Appendix B. Appendix C contains EPA's *Guidance Manual for Electroplating and Metal Finishing Pretreatment Standards*.

2.0 INTRODUCTION

2.1 Purpose of the RCRA Facility Assessment

The 1984 Hazardous and Solid Waste Amendments (HSWA) to RCRA provide authority in the RCRA program to assist the EPA in implementing corrective action at RCRA facilities. RCRA facilities include all facilities that currently treat, store, or dispose of hazardous waste (or have done so in the past) as regulated under RCRA. HSWA refocused the corrective action program from detecting and correcting future releases from regulated units to cleaning up problems resulting from current and past waste management practices at RCRA facilities. The HSWA corrective action program addresses releases to all media, including groundwater, surface water, air, surface soil, and subsurface soil, both on and off site and sources across the entire facility.

The first step in the RCRA corrective action process is the RFA, which consists of an appropriate combination of the following steps: preliminary review of records, VSI, sampling visit, and completion of the final RFA Report. RFAs compile existing information on environmental conditions at a given facility, including information on actual or potential releases. The RFA focuses on obtaining information on the potential that a release has occurred from any SWMU or any other area where wastes have been managed at the facility. A SWMU is defined as any discernable waste management unit at a RCRA facility from which hazardous constituents might migrate, irrespective of whether the unit was intended for the management of solid and/or hazardous waste. The definition includes containers, tanks, surface impoundments, waste piles, land treatment units, landfills, incinerators, underground injection wells, recycling units, wastewater treatment units, and areas contaminated by "routine, systematic, and deliberate discharges" from process areas. In addition to identifying releases from SWMUs, the RFA should also investigate evidence of spills and/or other releases resulting from waste management activities that may not fit the definition of a SWMU release.

2.2 General Procedures Used for Gathering Information

Each step of the RFA requires the collection and analysis of data to support release determinations. During the preliminary review process, existing information is evaluated, such as inspection reports and permit applications, and interviews are conducted with federal and state personnel who are familiar with the facility. Additional information is gathered during the VSI, including visual observation of the site, interviews with the owner/operator, and review of requested file material.

During the file review, oversized figures and tables were not copied to limit resource expenditure.

Under Work Assignment No. R09203, EPA Region 9 tasked Booz Allen Hamilton (Booz Allen) to conduct an RFA of the LMSC facility located in Sunnyvale, California. Initial file searches were conducted in 2002 at the EPA Region 9 office in San Francisco, California, and at the California RWQCB Region 2 office in Oakland, California. The information obtained during this 2002 file review was incorporated into the Preliminary Review Report that was submitted to EPA Region 9 on September 25, 2002. The Preliminary Review Report included an Information Needs List.

In the fall of 2002, EPA requested that Booz Allen conduct an analysis of the *Source Characterization and Plume Delineation Report* prepared by LMSC, dated August 24, 1999, to determine if the document was equivalent to an RFA Report. Booz Allen concluded that the LMSC report did not provide the level of detail about facility history, permitting status, compliance history, waste management, hazardous waste/constituent release history, and corrective actions at the facility that typically would be included in an RFA.

In 2003, EPA requested that Booz Allen perform a second file review to attempt to find the missing data identified in the Information Needs List from the Preliminary Review Report. During this second phase of the file review, Booz Allen reviewed LMSC files at the following agencies:

- California RWQCB Region 2 (Oakland)
- BAAQMD
- EPA Region 9 RCRA Records Center
- EPA Region 9 Superfund Records Center.

Based on the results of this 2003 file review, Booz Allen prepared and submitted a revised Preliminary Review Information Needs List. During the 2003 file review, Booz Allen learned that additional information about the facility was present at local agencies. Therefore, EPA Region 9 requested that Booz Allen conduct a third file review to address missing information. During this third phase of the file review, conducted in 2004, Booz Allen reviewed LMSC files at the following agencies:

- California DTSC (five to six boxes)
- City of Sunnyvale Hazardous Materials Department (100 files)
- Santa Clara Valley Water District (online files)

In addition, the County of Santa Clara Department of Environmental Health was contacted; however, they reported that they have no file material on the facility.

Information obtained from all the file reviews was incorporated into this revised Preliminary Review Report. Remaining data gaps are identified in the Information Needs List in Appendix B.

2.3 Facility Information

The EPA ID number for the facility is CAD009125535. The Standard Industrial Code for the business is 3761, Guided Missiles and Space Vehicles. LMSC's original RCRA Part A permit application, submitted on November 19, 1980, lists the nature of the business as "missiles and spacecraft manufacturing." The Part A permit application resubmittal, dated December 21, 1984, describes the nature of the business as "treatment and storage of spent plating bath solutions from electroplating operations which are part of missiles and spacecraft manufacturing" (refs 37, 59).

Much of the work conducted at this facility is classified. Therefore, access to many of the buildings is severely restricted by LMSC's security department (ref 1).

3.0 SITE DESCRIPTION

3.1 Site Location

Lockheed Martin Corporation Missiles and Space Plant One Facility is located at 1111 Lockheed Way, Sunnyvale, California, 94089. The 660-acre site is located in Santa Clara County, California, in Sections 12 and 13, Township 6 South, Range 2 West (latitude: 37 24' 10", longitude: 122 02' 10") (refs 1, 2) (Figure 1).

The LMSC facility lies at the southwest end of the San Francisco Bay within the limits of the Santa Clara Valley Water District and the City of Sunnyvale. Directly to the north are large salt evaporation ponds that were constructed by the Leslie Salt Company in the 1950s that are still active today. The Guadalupe Slough and Moffet Channel also border the site to the north, and are located beyond flood protection dikes north of the site boundary (ref 35). The slough drains into the San Francisco Bay, which is one mile northwest of the facility. A sanitary landfill for the City of Sunnyvale is located to the northeast of the facility. The Mountain View-Alviso Road (also known as State Highway 237) and Bayshore Freeway (also known as US Highway 101) intersection borders the facility to the south. Moffett Field Naval Air Station adjoins the facility roughly one mile to the west/southwest (refs 1, 2, 8, 35).

The nearest residence is located in the Orchard Gardens development, less than a quarter mile south of LMSC, and north of US Highway 101. In addition, there is a mobile home park located east of the Orchard Gardens development (ref 1). Residential neighborhoods and trailer parks are also located beyond the southeastern border.

Small office and commercial buildings, including buildings associated with the Supertex Inc., site, are situated just outside the eastern boundary of LMSC. These office facilities were constructed on farmland between 1974 and 1980. Supertex is a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site (refs 1, 2, 8, 35).

3.2 Owner/Operator History

3.2.1 Current Owners and Operators

Lockheed Missiles & Space Company, Inc., is a wholly-owned subsidiary of Lockheed Corporation. The facility began missile and satellite manufacturing operations in the 1950s. The LMSC facility in Sunnyvale has several aliases including:

- a. Lockheed Missiles and Space Company, Inc.

- b. Lockheed Martin Corporation, Missiles & Space
- c. The Plant One site
- d. Lockheed Martin Space Systems Company (refs 1, 2, 26).

The U.S. Navy owns a 48-acre parcel in the middle of the facility that includes several buildings, notably Building 182. This parcel was sold to the U.S. Navy in the late 1950s and is considered "government-owned and company-operated" (refs 1, 35, 36, 73).

Mathilda Java, LLC, and Sunnyvale Mathilda Land, LLC, acquired parts of the original LMSC facility within the last decade. See Figure 2 for a depiction of site layout and boundaries as of November 2000 (ref 35). The following table lists the current owners of the 660-acre facility.

Table 3: Current Property Owners			
Current Owners	Property Address	Property Description	Dates Owned
Lockheed	1111 Lockheed Martin Way	Currently owns 572 acres of the original 660-acre site	1950s – present
U.S. Navy	Unknown	48-acre parcel located in the middle of the site	1950s – present
Mathilda Java, LLC	1302/1350 North Mathilda Avenue	Assessor's Parcel Number 110-26-044. Total of 7.87 acres including Buildings 177 and 178 located on the eastern border of the site.	1990s – present
Sunnyvale Mathilda Land, LLC	West side of North Mathilda Avenue, straddling 1 st Avenue	Assessor's Parcel numbers 110-01-023, and 110-01-030. Total of 34.05 acres including Buildings 160, 161, 162, and 170.	1999 – present
Sunnyvale Mathilda Land, LLC	North of former Building 170	Includes location of former Building 130	1990s – present

3.2.2 Operating History

1950s

LMSC acquired the majority of the 660-acre parcel, which was being used for agricultural purposes, in the mid-1950s. A short time after acquiring the property, LMSC sold a 48-acre parcel to the U.S. Navy. Other portions of the facility were owned by B-S-K Associates and the Prudential Insurance Company of America, but were leased to LMSC. In 1956, LMSC began construction of Building 103, the first building on the LMSC site. Manufacturing operations started in 1958 (refs 2, 35).

1960s – 1980s

Most of LMSC's manufacturing and chemical process facilities were operational by 1963 (refs 1, 35). From the 1960s until the early 1980s, LMSC's operations grew and expanded. Facility operations including research, testing, manufacturing, laboratory, and office activities historically took place in 35 permanent large buildings, and approximately 30 smaller fixed and mobile structures (refs 1, 2, 35) (Figure 3).

1990s – present

During the 1990s, LMSC reduced the scope of operations and decommissioned several buildings and structures. During this downsizing, LMSC divested approximately 40 acres of property that was historically, or is currently, impacted by soil or groundwater contamination from facility operations. All current landowners of the contaminated site are considered responsible parties; however, LMSC is considered the primary responsible party. The remaining owners are considered secondarily responsible for contaminant cleanup of their properties (refs 1, 2, 35) (Figure 2).

3.3 Historical Releases

Numerous references to releases were found in the file material. Table 4 provides information on the releases that are represented in the file material.

Table 4: Historical Releases

Location	Source	Date of Release/ Detection	Contaminants	Release Information	Remediation Activities
Building 071 (ref 107)	Aboveground storage tank (AST)	July 14, 1994	Wastewater pH 2 (acidic wastewater)	Overflow of acidic wastewater from the AST to soil. Approximately one to ten gallons.	LMSC was to investigate and remediate the soil.
Building 102 (ref 115)	Former Underground Vault (SWMU 102-1)	February 18, 1987	Trichloroethane (TCA) (100%)	Approximately ten gallons spilled onto soil due to a faulty pressure relief valve.	LMSC was going to excavate the soil.
Building 103 (ref 53)	Concrete equipment vault	Discharge detected on June 19, 1989	Oil and grease	Lockheed notified the City of Sunnyvale of a hazardous materials discharge on September 26, 1989. A monitoring well sample reported 2.2 mg/L oil and grease.	Unknown
Northeast of Building 103 (ref 2)	Unknown	July 20, 1987	1,1,1-TCA	Between 5 and 15 gallons TCA spilled onto asphalt.	25 cubic yards of asphalt and soil were removed on August 11, 1987. The excavation averaged 2.5 feet (ft) in depth.

Table 4: Historical Releases

Location	Source	Date of Release/ Detection	Contaminants	Release Information	Remediation Activities
Building 114 (ref 72)	Five-gallon metal container ruptured	July 5, 1990	30% hydrogen peroxide	Approximately one liter of hydrogen peroxide was released. The spill occurred in an area with secondary containment.	Release occurred in a contained area and was cleaned up.
Buildings 125 and 128 (ref 110)	Poor house keeping in general vicinity	August 11, 1987	TCA (26 ppm), Trichloroethene (TCE) (13 ppm), Toluene (6 ppm), Ethylbenzene (12 ppm), Xylene (160 ppm)	Contaminants were discovered during a soil investigation in November 1996. Approximately the top six feet of the soil was contaminated.	Lockheed was to perform soil excavation.
Building 151 (ref 111)	Printed circuit board manufacturing operation	May 25, 1989	Methylene Chloride (14 ppm), TCE (2.2 ppm), Tetrachloroethane (PCE) (83 ppm), Chlorobenzene (5 ppm)	The lab analysis of soil below the concrete slab of the circuit board manufacturing operation indicated the soil was contaminated.	Further sampling was going to be conducted.

Table 4: Historical Releases

Location	Source	Date of Release/ Detection	Contaminants	Release Information	Remediation Activities
Building 151 (ref 112)	Release from underground waste tank	October 20, 1989	TCE (11 ppb), Xylene (5 ppm), 1,1-dichloroethane (DCA), (12 ppb), Trans-1,2-dichloroethene (DCE) (5 ppb)	Contaminants were discovered in groundwater during tank removal.	Lockheed had an ongoing groundwater investigation program within Building 151 vicinity.
Building 151 (ref 113)	Poor house keeping in general vicinity	September 30, 1987	TCA (3,000 ppm), 1,1-DCA (120 ppm), 1,1-DCE (140 ppm)	Contaminants were discovered through soil sampling. Soil was contaminated to approximately two feet below ground surface (bgs).	LMSC was going to hire McLaren Environmental Engineers for remedial action plan.
Building 157 (ref 108)	Punctured 55-gallon drum	February 26, 1987	Waste 1,1,1-TCA	Approximately 40-gallons of waste 1,1,1-TCA was released accidentally when a drum was punctured at the loading dock.	The spill was diked and contained.

Table 4: Historical Releases

Location	Source	Date of Release/ Detection	Contaminants	Release Information	Remediation Activities
West of Building 170 (ref 2)	Baghouse dust collection area	Unknown	Beryllium	In October of 1987, Lockheed documented the release of one-third of a pound of beryllium turnings and debris.	Samples collected from the spill area contained 3.2 to 10.6 percent beryllium by weight. Lockheed performed a series of excavations in this area. In 1998, during closure of Building 170, additional sampling and excavation was conducted until confirmation samples were within background levels.

Table 4: Historical Releases

Location	Source	Date of Release/ Detection	Contaminants	Release Information	Remediation Activities
Building 170 (ref 62)	Bullard #4 concrete coolant sump	November 6, 1997	Synthetic coolant (no constituents identified)	The concrete coolant sump typically holds coolant to a depth of one to two feet and has a capacity of approximately 200 gallons. The amount of coolant loss is not known.	The sump was drained on November 10, 1997. Lockheed planned to seal the sump followed by integrity testing prior to reuse; however, it is unknown whether this action was completed. Depth to groundwater beneath the sump is approximately ten feet. Lockheed indicated that the groundwater extraction system operating directly downgradient would capture any contamination.
Building 182 (ref 54)	Plating tank	October 17, 1989	Chromic acid	Earthquake caused approximately 200 gallons of chromic acid to spill from a plating tank into the street and parking area.	No specific information provided.
Building 182 (ref 108)	Leak from piping	September 14, 1989	Hexavalent chromium	29 ppm of hexavalent chromium in solution leaked from the piping onto the soil.	LMSC removed the contaminated soil.

Table 4: Historical Releases

Location	Source	Date of Release/ Detection	Contaminants	Release Information	Remediation Activities
Building 182 (ref 108)	Metal finishing rinsewater system	August 10, 1989	Corrosive water (pH 10.8), Chromium (0.6 ppm)	Approximately 1,000- gallons overflowed from the metal finishing rinsewater system.	LMSC recovered the liquid collected in the sump. Unknown amount of liquid seeped into the soil.
Storm Water Ditch 001 (ref 76)	Solution line	June 11, 1990	Nitrate, Diethylamino- ethanol	Approximately 2,000- gallons of chilled solution containing 200 ppm nitrate, and an unknown concentration of diethylaminoethanol, were released when a chilled water line was ruptured. The water entered Drainage Ditch 001 which empties into the wetland area. See Figure 10 for a depiction of the spill area and sampling locations.	Drainage Ditch 001 was diked with dirt to contain the release. Several hundred gallons of solution pooled in a flatland area. Material released was pumped from the ditch and pooled area. No characterization data of the waste were located during the file review; however, soil samples were collected from the standing liquid at the pipe break, the drainage ditch, the flatland past the berm, and from the wetlands bird pond.

3.4 Processes

Processes that support LMSC's missile and satellite development operations include metal plating, etching and chemical milling, degreasing, spray painting, printed circuit board manufacturing, chemical processing, and photoprocessing. These operations require the storage and use of acids, bases, metal solutions, solvents, fuel hydrocarbons, and small amounts of radioactive material (ref 1). Table 7 lists information about the known locations of plating areas, spray paint booths, and degreasers. Overall, the file material contained limited information about LMSC's manufacturing and development processes.

Etching, Chemical Milling, and Metal Plating

LMSC performs non-electrode plating and electroplating of common and precious metals, including nickel, chromium, copper, zinc, lead, and iron at several locations throughout the site (Table 7). File sources indicate that there are seven plating shops located at the facility in various buildings (refs 1, 2). No specific descriptions of the etching, chemical milling, and metal plating performed at the facility were found during the file review; however, a generic description of electroplating, electroless plating, anodizing, coating, and chemical etching and milling is provided in Appendix C, *Guidance Manual for Electroplating and Metal Finishing Pretreatment Standards*.

Degreasing

Degreasing operations of varying magnitude are located in 40 areas throughout the site. The degreasing units range from small table-top units to large units used for the metal parts assembled in manufacturing operations. Solvents used to degrease parts include: TCA, Freon-113, Freon TF, Freon RES, and Alpha 565. See Table 7 for the location of the degreasing units (refs 1, 2).

Spray Painting

Approximately 49 spray booths in 19 buildings were identified at the facility (ref 1). No information on the operations, or the types and amounts of associated wastes, was found in the file material.

Printed Circuit Board Manufacturing

LMSC manufactures printed circuit boards; however, information indicating the location of circuit board manufacturing, quantities of waste generated, and waste handling was not found in the file material. In addition, specific descriptions of the circuit board manufacturing processes at the facility were not found in the file material; however, a generic description of printed circuit board manufacturing is contained in Appendix C.

Chemical Processing

In 1981, LMSC indicated that there were six chemical processing facilities and 100 plating lines. The chemical processing units were located in Buildings 103, 150, 151, 159, 170, and 182 (refs 1, 2).

Photoprocessing

Photoprocessing was conducted at the facility; however, the location of the photoprocessing, the amount of waste generated, and the disposition of waste were not described in the file material (ref 23).

3.5 Waste Management

Waste streams that LMSC currently handles, or has historically handled, are listed in Table 5. Table 5 identifies the EPA hazardous waste numbers, the contaminant or general description, and the Part A estimated annual quantity (ref 37).

Table 5: RCRA Wastes Codes Handled		
EPA Hazardous Waste No.	Contaminant or General Description	Part A Estimated Annual Quantity
D001	Ignitability	13 tons
D002	Corrosive	7 tons 3,000,000 lbs
D006	Cadmium	Unknown
D007	Chromium	3,000,000 lbs
D008	Lead	Unknown
D011	Silver	Unknown
F001	Spent solvents	57 tons
F002	Spent solvents	8,250 lbs
F003	Spent solvents	833 lbs
F004	Spent solvents	250 lbs
F005	Spent solvents	3 tons

EPA Hazardous Waste No.	Contaminant or General Description	Part A Estimated Annual Quantity
F006	Plating wastes	4 tons
F007	Plating wastes	900 tons
F008	Plating wastes	50 tons
F009	Plating wastes	1,150 tons
F010	Plating wastes	1,666 lbs
P015	Beryllium powder	4 tons
P030	Cyanides	6,800 lbs
P104	Silver cyanide	830 lbs
P106	Sodium cyanide	6,800 lbs
U002	Acetone	416 lbs
U013	The U013 listing for asbestos is not currently regulated.	50 lbs
U019	Benzene	83 lbs
U112	Ethyl acetate	10 lbs
U134	Hydrofluoric acid	33.2 lbs
U151	Mercury	8.33 lbs
U154	Methanol	1,666 lbs
U186	1-Methylbutadiene	8.3 lbs
U211	Carbon tetrachloride	166 lbs
U213	Furan, tetrahydro-	833 lbs
U220	Benzene, Methyl-	2,500 lbs
U223	Benzene, 1,3-diisocyanatomethyl-	166 lbs
U226	Methyl chloroform	833 lbs
U228	TCE	208 lbs

EPA Hazardous Waste No.	Contaminant or General Description	Part A Estimated Annual Quantity
U229	The listing U229 applied to trichlorofluoromethane. This listing is no longer applicable (*U229 was promulgated in an Interim Final Rule on May 19, 1980 (45 FR 33084). On November 25, 1980 (45 FR 78532), the U229 listing was deleted)	83 lbs
U239	Benzene, dimethyl-	210 lbs

In addition, it appears that LMSC may have received waste from off-site locations; however, the types and amounts of waste, and the dates that the waste was accepted, are unknown (ref 91).

The bulk of LMSC's waste streams are wastewater or wastewater treatment sludges. Typical waste streams generated at the facility include:

- Metal-bearing wastewater streams
- Acidic or alkaline wastes not containing metals
- Metal-bearing sludge produced through treatment of wastewaters
- Spent or off-specification process solutions
- Laboratory waste
- Maintenance wastes (ref 38).

Various processes have been used over the years to treat hazardous and nonhazardous waste. Limited information was present in the file material regarding LMSC's waste handling practices prior to 1980.

According to the original Part A permit application, LMSC stored 64,010 gallons per year of hazardous waste in tanks, 36,585 gallons per year of hazardous waste in containers, and 42,500 gallons per day of hazardous waste in tanks (ref 37).

In addition, LMSC stored wastewater in a cluster of four surface impoundments prior to discharge to the City of Sunnyvale's Publically Owned Treatment Works (POTW). Two of these impoundments received hazardous waste; the remaining two received only nonhazardous waste. LMSC also operated an on-site incinerator, which primarily accepted nonhazardous waste. Waste treatment and storage processes are described below (refs 1, 2).

Wastewater Treatment

Historically, a significant portion of the facility's waste has been piped or trucked to Building 114 for treatment and storage. Building 114 was constructed in 1986 and contains the CWTP, a cyanide destruction unit, and a less than 90-day waste chemical drum storage area. Specifically, Building 114 has contained the following waste treatment/processing units:

- Former Andco Treatment Unit (SWMU 114-1)
- Former Clarifier/Sludge Thickening Unit/Filter Press (SWMU 114-2)
- Former HMPU (SWMU 114-3)
- Former Cyanide Destruction Unit (SWMU 114-4)
- Hazardous Waste Container Storage Area (SWMU 114-5) (ref 2).

Historically, the previously-operated Andco treatment unit was the first stage of pre-treatment for rinsewaters, wastewaters, and other process-related solutions. Plating wastes were piped to the Andco treatment unit from Buildings 071, 103, 150, 151, 159, 170, and 182. At least one plating operation discharged metal finishing effluent directly to the POTW (ref 1). The amount and types of wastes that were accepted from other portions of the facility were not identified in the file material. Pre-treatment activities in the former Andco unit included: 1) neutralization of liquid corrosive metals, and 2) electrochemical reduction of hexavalent chromium to trivalent chromium (refs 1, 2). A schematic of the wastewater treatment process is shown in Figure 5; however, this diagram was created in 1981 and depicts the proposed treatment process (ref 20).

Following pre-treatment in the former Andco unit, wastewater was piped to the Clarifier/Sludge Thickening Unit/Filter Press (SWMU 114-2) where solids were precipitated from the wastewater. The effluent wastewater was then routed to the surface impoundment cluster. The metal hydroxide sludge generated during the course of the treatment train was transferred to the Building 114 Hazardous Waste Container Storage Area (SWMU 114-5).

Surface Impoundment Storage

Wastewater from the CWTP, and other wastes from the facility, have been stored in a cluster of four surface impoundments prior to discharge to the City of Sunnyvale's POTW. Two of these surface impoundments, the Evaporation Ponds (SWMU Surface Impoundment Cluster-1), were considered RCRA surface impoundments, but were not identified in either the facility's original or resubmitted Part A permit application. The remaining two surface impoundments are classified as Class II, nonhazardous waste impoundments, and are referred to as the Holding Ponds (SWMU Surface Impoundment Cluster-2). The Holding Ponds began operation in 1983 and are still in

operation. The hazardous waste surface impoundments began operation in 1983 and were closed in 1985 (refs 1, 2).

A diagram of the wastewater treatment process prior to surface impoundment operation is depicted in Figure 4 (ref 20).

Printed Circuit Board Manufacturing Wastes

Until 1994, wastes from circuit board manufacturing were neutralized in the Building 113 elementary neutralization unit (SWMU 113-2). The neutralization unit was a three-staged concrete bermed unit that utilized sulfuric or hydrofluoric acid for neutralization. Following neutralization, it appears that waste from printed circuit board manufacturing was discharged directly to the city sewer (ref 2). The disposition pathway for these wastes prior to, during, and after, the evaporation ponds were operated is not clear from the available material. It is also unclear which buildings generate printed circuit board manufacturing wastes.

Spent Solvents

Two solvent recovery units were identified at the facility. The solvent recovery unit in Building 151 recovery methylene chloride (ref 90). It is unclear what type of solvent(s) the second unit, which is located in Building 102, recovers. No information was found in the file material indicating the disposition of solvent heels, or the regulation of air emissions from these units.

Waste Storage

According to the Part A permit application, LMSC stored 64,010 gallons per year of hazardous waste in tanks. These tanks are located both above ground and below ground and store a variety of wastes including beryllium, waste oil, and plating wastes (refs 1, 2).

Storm Water

Storm Water Ditches 001 and 002 discharge to the LMSC and Moffett Channels that run along the northern end of the facility and ultimately discharge to Guadalupe Slough. Historically, cooling water blowdown was discharged through these channels to the slough. File information indicates this practice has been discontinued (ref 1).

Container Storage

Site 14E was used from 1959 until 1986 to store hazardous wastes and recyclable materials. The primary collection site for hazardous waste from 1986 until the present is in Building 114 (ref 2).

Incineration

Factory refuse was combusted in the Building 171 incinerator. This factory refuse consisted primarily of waste paper and cardboard; however, a small portion of the combusted waste was considered RCRA hazardous. No indication of the years of operation was found in file materials (refs 37, 40, 59).

USTs

Seven double-walled petroleum USTs were actively used at LMSC as of 1999. The locations of these tanks, as well as several former USTs, are depicted on Figure 6 (refs 2, 96).

Release Controls

There was no information on the unit's release controls in the file material.

History of Release

On October 24, 1991, lead- and chromium-contaminated soil was excavated and stockpiled from the vicinity of this unit. Confirmation sampling indicated that the remaining soil was nonhazardous (ref 2). There was no specific information pertaining to the source of the release or the quantity and concentration of the lead and chromium contaminated soil in the file material.

Remedial Actions

Lead and chromium contaminated soil was excavated in the vicinity of this unit on October 24, 1991 (ref 2).

Soil/Groundwater Release Potential

The release potential is unknown because the integrity of this unit's secondary containment could not be determined from the file material.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past and current release potential is unknown because it is unclear if this unit vented to the atmosphere.

6.3.5 SWMU 071-5: Hazardous Waste Tank (T-115)Unit Description

The Hazardous Waste Tank (T-115) has a capacity of 10,000 gallons. T-115 is located behind Building 071 (ref 100). There was no information in the file material pertaining to the unit's date of construction, material of construction, or dimensions.

6.3 BUILDING 071

Building 071 is located in the north central area of the facility, on the corner of Third Avenue and E Street, adjacent to Building 159 (Figure 2).

The current status of the building could not be confirmed without conducting a VSI. However, the file material suggests that Building 071 was handling hazardous waste as of 2004 (ref 104).

6.3.1 SWMU 071-1: Plating Areas (1)

See discussion of Plating Areas in Section 6.1.1 (ref 1).

6.3.2 SWMU 071-2: Spray Paint Booths (4)

See discussion of Spray Paint Booths in Section 6.1.2 (ref 1).

6.3.3 SWMU 071-3: Degreaser (1)

See discussion of Degreasers in Section 6.1.3 (ref 104).

6.3.4 SWMU 071-4: Demineralizer

Unit Description

The Demineralizer was used to neutralize metal-bearing wastewater from metal finishing operations prior to pumping the wastewater to the Former HMPU (SWMU 114-3) at Building 114 (refs 100, 106).

There was no information in the file material regarding this unit's material of construction or dimensions.

Wastes Managed

The current status of this unit is unknown. A RCRA permit would be required to operate this unit. This unit treated approximately 200,000 gallons of wastewater per month as of 1993 (ref 106). The types of wastes handled by this unit included wastewater from metal finishing operations which were typically acidic and contain concentrations of heavy metals such as chromium VI, copper, nickel, lead, iron, and zinc (ref 2).

Release Controls

There was no information on the unit's release controls in the file material.

History of Release

TCE and trans-1,2-DCE were detected in shallow soil surrounding this unit at 6.2 mg/kg and 2.5 mg/kg, respectively, during the decommissioning of Building 14E/041 in December 1986 (ref 2).

Remedial Actions

Soil was excavated from three areas in the vicinity of Building 14E in December 1986. Soil was removed along the northern edge of the site from an area approximately 115 feet long by 10 feet wide, which was used for acidic and solvent storage. Soil from the eastern part of this area was excavated to a depth of five feet below grade, and soil from the western part of this area was excavated to a depth of 3.5 feet below grade (ref 2).

Groundwater monitoring was conducted from July 1985 through February 1987 at monitoring wells located immediately upgradient, within, and downgradient of Building 14E/041 (ref 2).

Soil/Groundwater Release Potential

The past release potential was moderate because of prior releases detected in the vicinity of this unit in December 1986.

The current release potential is low due to the removal of the waste oil tank.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past release potential is unclear because it is unknown if this unit vented directly to the atmosphere.

The current release potential is low due to the unit no longer being present.

Soil/Groundwater Release Potential

The past release potential was moderate because of prior releases detected in the vicinity of this unit in December 1986.

The current release potential is low due to the removal of contaminated soil and the fact that the unit is no longer present.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past release potential is unclear because it is unknown if this unit vented directly to the atmosphere.

The current release potential is low due to the unit no longer being present.

6.2.3 SWMU 14E/041-3: Former Underground Waste Oil Tank (WT14E)Unit Description

The Former Underground Waste Oil Tank was located east of Building 14E/041 and was in the center of the Former 14E Waste Container Storage Area (SWMU 6.2.2) (ref 2).

WT14E was constructed of concrete and had a capacity of 1,400 gallons (refs 2, 103). There was no information in the file material indicating the date of construction or dimensions of the waste oil tank.

A sump was attached to the waste oil tank. The waste oils were poured into the sump which drained into the underground tank (ref 2).

Wastes Managed

There is no information in the file material regarding when the unit began operating; however, the unit was removed in 1986 (ref 2). Also, there was no information about the origin of the waste oil at the facility. Table 5 presents a complete list of the RCRA codes that apply to the wastes stored in this unit.

6.2.2 SWMU 14E/041-2: Former 14E Hazardous Waste Container Storage Area

Unit Description

The Former 14E Waste Container Storage Area was used to store hazardous and recyclable materials. The size of the Former 14E Waste Container Storage Area was approximately two acres (ref 2).

Wastes Managed

This unit was active from 1959 to 1986 would have required a RCRA permit. The types of wastes managed at this unit include solvents, ammonium hydroxide, sodium chlorate, sodium hydroxide, sodium chlorite, formaldehyde, silver solutions, potassium ferricyanide, zinc, cadmium, chromium, copper, acids, oils, and magnesium metal turnings (ref 2). Table 5 presents a complete list of the RCRA codes that apply to the wastes stored in this area. LMSC's original Part A permit application indicates that 36,585 gallons of hazardous waste were managed in the container storage area annually. The wastes were stored in 5- to 55-gallon drums, or metal bins (refs 59, 61).

Release Controls

The Former 14E Waste Container Storage Area was paved the entire time it was in use (ref 2).

History of Release

TCE and trans-1,2-DCE were detected in shallow soil surrounding this unit at 6.2 mg/kg and 2.5 mg/kg, respectively, during the decommissioning of Building 14E/041 in December 1986 (ref 2).

Remedial Actions

Soil was excavated from three areas in the vicinity of Building 14E in December 1986. Soil was removed along the northern edge of the site from an area approximately 115 feet long by 10 feet wide, which was used for acidic and solvent storage. Soil from the eastern part of this area was excavated to a depth of five feet below grade and soil from the western part of this area was excavated to a depth of 3.5 feet below grade (ref 2).

Groundwater monitoring was conducted from July 1985 through February 1987 at monitoring wells located immediately upgradient, within, and downgradient of Building 14E/041 (ref 2).

1995, DTSC identified 30 active spray paint booths located in 19 buildings throughout the facility (ref 100). The current status of the spray paint booths is unknown.

The waste generated by the spray paint booths is comprised of excess coating materials (paint) from overspraying and drums of carbon used as air pollution control devices. The waste is collected and stored at the Building 114 Hazardous Waste Container Storage Area (SWMU 114-5) (ref 100). Refer to Table 5 for a complete list of RCRA codes that apply to the wastes managed at spray paint booths.

6.1.3 Degreasers

Degreasing units have been operated at various locations throughout the site. A total of 40 degreasers operating at 19 different buildings were identified in the file material. Six of the degreasers are no longer operating. The current status of the remaining, and potentially active, 34 degreasers is unknown. As of 1995, DTSC identified 17 active degreasing units located in various buildings throughout the facility (ref 100). The units range in size from small table-top units to large units used in manufacturing operations (ref 100). The solvents that are used in these operations are 1,1,1-TCA, freons, and a mixture of solvents known as Alpha 565. The waste solvent from the degreasing units is pumped into 55-gallon drums, which are transferred and stored at the Building 114 Hazardous Waste Container Storage Area (SWMU 114-5) (ref 100). Refer to Table 5 for a complete list of RCRA codes that apply to the wastes managed in degreaser units.

6.2 BUILDING 14E/041

Building 14E/041 is located in the south central area of the facility between E Street and C Street, adjacent to Building 103 (Figure 2).

All operations at Building 14E/041 were ceased as of March 2002 (ref 101). The building was scheduled to be demolished; however, the specific date was not provided (ref 102). The current status of this building is unknown.

6.2.1 SWMU 14E/041-1: Former Spray Paint Booths (3)

Three spray paint booths were identified at the site as of 1990 (ref 1). See discussion of Spray Paint Booths in Section 6.1.2.

Report Section	Building No.	Identified SWMUs/AOCs
6.38	Waste Transfer Lines	AOC WTL: Waste Transfer Lines

6.1 Plating Areas, Spray Paint Booths, and Degreasers

Plating areas, spray paint booths, and degreasing operations are ubiquitous throughout the LMSC facility, and in many cases occur at several areas within the same building. Regardless of the location of the activity, the wastes associated with these units vary little; thus, a generic description is provided for plating areas, spray paint booths, and degreasers. These descriptions are referenced in each building section where these operations occur. The number of plating areas, booths, or degreasing units is indicated in parentheses following the SWMU name (e.g., Spray Paint Booths (3)).

6.1.1 Plating Areas (Operations)

Plating areas were identified at seven locations at the facility in Buildings 071, 103, 150, 151, 153, 170, and 182. However, two of the plating operations are no longer present (Buildings 103 and 170) (ref 104). As of 1995, DTSC identified LMSC as having two active metal plating shops at the facility in Buildings 071 and 170 (ref 100). However, since Building 170 has since been demolished, only one active metal plating operation remains.

Plating operations include both electroplating and electroless plating with common and precious metals (refs 1, 2), which require a RCRA permit. Plating operations handle wastewaters which are typically acidic and contain concentrations of heavy metals such as chromium VI, copper, nickel, lead, iron, and zinc (ref 2). At LMSC, wastes from most of the plating facilities are piped directly to the CWTP for treatment before being discharged to the evaporation or holding ponds and eventually to the POTW. A portion of the plating wastewater is directly discharged to the evaporation ponds (refs 1, 2). Refer to Table 5 for a complete list of RCRA codes that apply to the wastes processed at metal plating operations.

6.1.2 Spray Paint Booths

A total of 49 spray paint booth locations in 19 buildings were identified in the file material. Nine of the spray paint booths are no longer operating at the facility. As of

Report Section	Building No.	Identified SWMUs/AOCs
NA	573	No SWMUs or AOCs identified
NA	574	No SWMUs or AOCs identified
NA	575	No SWMUs or AOCs identified
NA	583	No SWMUs or AOCs identified
NA	588	No SWMUs or AOCs identified
NA	1001	No SWMUs or AOCs identified
NA	1002	No SWMUs or AOCs identified
NA	1004	No SWMUs or AOCs identified
NA	1005	No SWMUs or AOCs identified
NA	1006	No SWMUs or AOCs identified
NA	1007	No SWMUs or AOCs identified
NA	1008	No SWMUs or AOCs identified
NA	1009	No SWMUs or AOCs identified
NA	1010	No SWMUs or AOCs identified
NA	1013	No SWMUs or AOCs identified
NA	1016	No SWMUs or AOCs identified
NA	1018	No SWMUs or AOCs identified
NA	1023	No SWMUs or AOCs identified
NA	1024	No SWMUs or AOCs identified
NA	001 U.S. Air Force	No SWMUs or AOCs identified
6.36	Surface Impoundment Cluster	SWMU Cluster-1: Evaporation Ponds SWMU Cluster-2: Holding Ponds
6.37	Storm Ditch 001	AOC 001-1: Storm Ditch 001

Report Section	Building No.	Identified SWMUs/AOCs
NA	185	No SWMUs or AOCs identified
6.31	186	AOC 186-1: Leaded Gas UST
6.32	187	SWMU 187-1: Waste Oil Tank
6.33	188	SWMU 188-1: Former Spray Booth (1)
NA	189	No SWMUs or AOCs identified
NA	190	No SWMUs or AOCs identified
NA	191	No SWMUs or AOCs identified
NA	194	No SWMUs or AOCs identified
NA	195A	No SWMUs or AOCs identified
6.34	195B	SWMU 195B-1: Spray Booth (1) SWMU 195B-2: Degreaser (1)
NA	195D	No SWMUs or AOCs identified
NA	196	No SWMUs or AOCs identified
NA	528	No SWMUs or AOCs identified
NA	560	No SWMUs or AOCs identified
NA	561	No SWMUs or AOCs identified
6.35	562	SWMU 562-1: Former Degreaser (1) SWMU 562-2: Former Wastewater Treatment System SWMU 562-3: Former Hazardous Waste Tanks (WT562-1 and WT562-2)
NA	563	No SWMUs or AOCs identified
NA	564	No SWMUs or AOCs identified
NA	565	No SWMUs or AOCs identified
NA	566	No SWMUs or AOCs identified
NA	567	No SWMUs or AOCs identified
NA	571	No SWMUs or AOCs identified
NA	572	No SWMUs or AOCs identified

Report Section	Building No.	Identified SWMUs/AOCs
6.24	170	SWMU 170-1: Former Plating Area (1) SWMU 170-2: Former Spray Paint Booths (4) SWMU 170-3: Former Degreasers (2) SWMU 170-4: Former Waste Beryllium Tank (WT170-5) SWMU 170-5: Former Bag House Dust Area SWMU 170-6: Former Process Clarifiers (2) and Underground Sumps (4) SWMU 170-7: Former Storm Ditch 002 SWMU 170-8: Former Waste Oil Tank (WO170-WO) SWMU 170-9: Former Hazardous Waste Tank (WT170-3)
6.25	171	SWMU 171-1: Incinerator
NA	172	No SWMUs or AOCs identified
NA	173	No SWMUs or AOCs identified
6.26	174	SWMU 174-1: Spray Paint Booths (6) SWMU 174-2: Demineralizer
NA	175	No SWMUs or AOCs identified
NA	177	No SWMUs or AOCs identified
NA	178	No SWMUs or AOCs identified
6.27	179	SWMU 179-1: Metal Wastewater Sump SWMU 179-2: Former Cyanide Destruction Unit SWMU 179-3: Baker Tank
NA	180	No SWMUs or AOCs identified
6.28	181	SWMU 181-1: Spray Paint Booth (1) SWMU 181-2: Silver Retention Sump
6.29	182	SWMU 182-1: Plating Area (1) SWMU 182-2: Spray Paint Booths (8) SWMU 182-3: Degreasers (5) SWMU 182-4: Hazardous Waste Tank (WT182-2) SWMU 182-5: Former Air Scrubbers SWMU 182-6: Acid Retention Sump SWMU 182-7: Metal Process Waste Sumps (3)
6.30	183	SWMU 183-1: Degreaser (1)
NA	184	No SWMUs or AOCs identified

Report Section	Building No.	Identified SWMUs/AOCs
6.17	150	SWMU 150-1: Plating Area (1) SWMU 150-2: Spray Paint Booth (1) SWMU 150-3: Degreaser (1) SWMU 150-4: Former Waste Container Storage Area SWMU 150-5: Hazardous Waste Tanks (WT150-2 and WT150-3)
NA	150A	No SWMUs or AOCs identified
6.18	151	SWMU 151-1: Plating Area (1) SWMU 151-2: Spray Paint Booths (7) SWMU 151-3: Degreasers (11) SWMU 151-4: Hazardous Waste Tanks (RW151-1 and WT151-2) SWMU 151-5: Former Waste Chemical Storage Area
6.19	152	SWMU 152-1: Spray Paint Booths (2) SWMU 152-2: Hoist Sump
6.20	153	SWMU 153-1: Plating Area (1) SWMU 153-2: Spray Paint Booths (5) SWMU 153-3: Degreasers (7)
NA	154	No SWMUs or AOCs identified
6.21	155	SWMU 155-1: Spray Paint Booth (1)
NA	156	No SWMUs or AOCs identified
NA	157	No SWMUs or AOCs identified
NA	158	No SWMUs or AOCs identified
6.22	159	SWMU 159-1: Spray Paint Booth (1) SWMU 159-2: Hazardous Waste Tanks (WT159-8 and WT159-9) SWMU 159-3: Waste Oil Tank (WO159-4)
NA	160	No SWMUs or AOCs identified
NA	161	No SWMUs or AOCs identified
NA	162	No SWMUs or AOCs identified
NA	164	No SWMUs or AOCs identified
NA	165	No SWMUs or AOCs identified
6.23	166	AOC 166-1: Former Automotive Service Station
NA	168	No SWMUs or AOCs identified

Report Section	Building No.	Identified SWMUs/AOCs
6.10	114	SWMU 114-1: Former Andco Treatment Unit SWMU 114-2: Former Clarifier/Sludge Thickening Unit/Filter Press SWMU 114-3: Former HMPU SWMU 114-4: Former Cyanide Destruction Unit SWMU 114-5: Hazardous Waste Container Storage Area
NA	119	No SWMUs or AOCs identified
NA	123	No SWMUs or AOCs identified
NA	125	No SWMUs or AOCs identified
NA	128	No SWMUs or AOCs identified
NA	129	No SWMUs or AOCs identified
6.11	130	SWMU 130-1: Former Degreaser (1)
6.12	132	SWMU 132-1: Former Solvent Waste Drums
NA	133	No SWMUs or AOCs identified
NA	134	No SWMUs or AOCs identified
6.13	136	SWMU 136-1: Spray Paint Booth (1)
NA	137	No SWMUs or AOCs identified
6.14	138	SWMU 138-1: Former Steam Cleaning Unit
NA	139	No SWMUs or AOCs identified
6.15	140	SWMU 140-1: Spray Paint Booth (1) SWMU 140-2: Waste Coolant Tank (WO140-1)
6.16	141	SWMU 141-1: Spray Paint Booth (1)
NA	143	No SWMUs or AOCs identified
NA	145	No SWMUs or AOCs identified
NA	146	No SWMUs or AOCs identified
NA	147	No SWMUs or AOCs identified
NA	149	No SWMUs or AOCs identified

Report Section	Building No.	Identified SWMUs/AOCs
6.3	071	SWMU 071-1: Plating Area (1) SWMU 071-2: Spray Paint Booths (4) SWMU 071-3: Degreaser (1) SWMU 071-4: Demineralizer SWMU 071-5: Hazardous Waste Tank (T-115) SWMU 071-6: Wastewater Tank (T-113) SWMU 071-7: Carbon Desorber
6.4	076	SWMU 076-1: Spray Paint Booth (1) SWMU 076-2: Degreaser (1)
NA	101	No SWMUs or AOCs identified
6.5	102	SWMU 102-1: Former Underground Vault
6.6	103	SWMU 103-1: Former Plating Area (1) SWMU 103-2: Former Degreasers (4) SWMU 103-3: Former Spray Paint Booth (1) SWMU 103-4: Former Plating Waste Tanks (WT103-1 and WT103-2) SWMU 103-5: Former Hazardous Waste Tanks (WT103-4 and RW103-5) SWMU 103-6: Former Waste Oil Tank (WO103-CO1) SWMU 103-7: Former Baker Tank
6.7	104	AOC 104-1: Soil Contamination Area 1 AOC 104-2: Soil Contamination Area 2
NA	105	No SWMUs or AOCs identified
NA	106	No SWMUs or AOCs identified
NA	107	No SWMUs or AOCs identified
6.8	109	SWMU 109-1: Waste Oil Tank 109 AOC 109-1: Former Underground Storage Tanks (4)
NA	110	No SWMUs or AOCs identified
NA	111	No SWMUs or AOCs identified
NA	112	No SWMUs or AOCs identified
6.9	113	SWMU 113-1: Degreasers (4) SWMU 113-2: Former Neutralization Unit SWMU 113-3: Hazardous Waste Tanks (WT113-1 and WT113-2)

6.0 SOLID WASTE MANAGEMENT UNITS AND AREAS OF CONCERN

Based on the review of file materials, 163 SWMUs and 10 AOCs were identified at the site. The SWMUs and AOCs are organized according to building location at the facility, as listed in Table 7 below. A more detailed discussion of these units, also organized by building, is provided in Sections 6.2 through 6.38. These sections are cross referenced in column one of Table 7.

SWMUs are numbered sequentially and by building number. For example, *SWMU 113-2: Former Neutralization Unit* is the second SWMU listed for Building 113. Numbers contained in brackets after the SWMU name indicate how many of that type of unit are in that particular building. For example, for *SWMU 071-3: Degreaser (1)*, the (1) indicates that there is one degreasing unit in Building 71.

As indicated in the table, plating areas, spray paint booths, and degreasing operations are ubiquitous at the LMSC facility. The wastes associated with each of these three operations differs little regardless of the location of the operation; therefore, a generic description is provided for plating areas, spray paint booths, and degreasers in Section 6.1. A map depicting the location of SWMUs and AOCs as of May 2005 (Figure 7).

Due to the fact that a VSI was not conducted and given the lack of current information in the file material, the current status and activity at a majority of SWMUs and AOCs is unknown, along with the current release potentials to soil, groundwater, surface water and air.

Table 7: SWMUs and AOCs by Building Location		
Report Section	Building No.	Identified SWMUs/AOCs
Not applicable (NA)	11C	No SWMUs or AOCs identified
6.2	14E/041	SWMU 14E/041-1: Former Spray Paint Booths (3) SWMU 14E/041-2: Former 14E Hazardous Waste Container Storage Area SWMU 14E/041-3: Former Underground Waste Oil Tank (WT14E)

californicus), the American peregrine falcon (*Falco peregrininus anatum*), and the snowy plover (*Charadrius alexandrinus nivosus*). Additionally, the adjacent wetlands support one threatened plant species, the marsh gum plant (*Grindelia humilis*) (ref 1).

The primary commercial fishing conducted in the South San Francisco Bay is for fishing bait such as shrimp and small fish. Some commercial herring fishing is conducted in the south bay, north of San Mateo Bridge and south of Hunters Point and the Alameda Naval Air Station. The South Bay is also used for recreational clamming along the mud flats on the western side of the bay (ref 1).

5.4 Climate

5.4.1 Precipitation

The mean annual precipitation in the vicinity of LMSC is approximately 12 inches per year. The estimated maximum 24-hour precipitation in the vicinity of the site is about 3.8 inches for a 100-year return period and 2.3 inches for a 5-year return period. Based on over 40 years of recorded precipitation data, the estimated maximum annual precipitation is 22.5 inches for a 100-year return and the estimated minimum annual precipitation is 4.9 inches for a 100-year return. The maximum rainfall between 1941 and 1980 was 19.4 inches and occurred in 1952. Rain, the most common form of precipitation in this region, is concentrated in the winter months between November and March. Recharge by precipitation occurs in December and January (refs 5, 20).

The average annual net evaporation was recorded at the Leslie Alviso Salt Ponds located northeast of the LMSC site. According to this data, net evaporation is measured at about 43 inches annually and the gross evaporation is approximately 55 inches annually (ref 20).

5.4.2 Temperature

The local climate is mild. The approximate average temperature at the facility is 58 F, with the highest average temperature of 78 F occurring in July, and an average low temperature of 43 F occurring in January (ref 93).

5.4.3 Wind

Prevailing winds in the neighboring City of Mountain View are north-northwesterly during the day and predominantly from the west in the evening. Winds are typically lightest during the fall and winter seasons. When winds are very light for several days, pollutants may build up locally (ref 97).

5.5 Ecological Receptors

The San Francisco Bay is used for commercial and recreational fishing, estuarine habitat, shellfish harvesting, fish migration, migratory waterfowl refuge, navigation, industrial service supply, water contact and non-contact recreation, and wildlife habitat. The tidal wetlands and sloughs adjacent to the LMSC site are habitat for six federally-listed endangered species: the salt marsh harvest mouse (*Reithrodontomys raviventris*), the California clapper rail (*Rallus longirostris obsoletus*), the California black rail (*Laterallus jamaicensis cotrunculus*), the California brown pelican (*Pelecanus occidentalis*

The third, deeper transmissive zone is thought to be contaminant free.

Off-Site Contamination

According to a report requested by JSR Microelectronics, who owns the adjoining property on the east boundary of LMSC, the LMSC plume extends off site in the northeast direction impacting groundwater under Buildings 563 and 564. Known contaminants include TCA, TCE, PCE, 1, 1-DCE, chloroform, TCFM, Freon 113, and hexavalent chromium. In addition, BDCM was detected at 1.5 ppb in groundwater according to a 1995 study by IHI Environmental (refs 8, 26).

5.3.2 Surface Water

Nearby Water Bodies

San Francisco Bay is the main body of water within three miles of the LMSC site. Tidal marshes and the Guadalupe Slough form the northern border of the LMSC facility. These wetlands have been proposed for addition to the San Francisco Bay National Wildlife Refuge. The Leslie Salt Company brine ponds are located in close proximity to the site (refs 1, 2, 5).

Storm Water Runoff

Two drainage ditches channel storm water from the site: Storm Ditch 001 and Storm Ditch 002. Storm Ditch 001 runs to the east of the surface impoundment cluster and Building 175. This storm water channel receives storm water runoff as well as significant quantities of discharge from the site on a fairly consistent basis. Storm Ditch 002 runs along the east side of Building 170. This Ditch is only used for storm water runoff and does not receive a significant quantity of flow on a consistent basis (ref 1).

Storm water runoff from the LMSC site drains into the LMSC Channel which runs along the northern boundary of the site. The channel is regulated by the LMSC pump station located approximately 1,500 feet from the northeastern boundary of the site, adjacent to the City of Sunnyvale landfill (see Figure 2). Water from the channel is pumped to the Guadalupe Slough which ultimately drains to the San Francisco Bay (ref 1).

Flood Potential

High tides and on-site generated storm water runoff are possible sources of flood threat to the facility. The 100-year high tide elevation determined by the U.S. Army Corps of Engineers for Moffett Field is 7.5 feet above MSL, which is over the top of the levees at LMSC's north boundary, and could potentially inundate the areas below 7.5 feet MSL (ref 5).

boundary of the LMSC site. Water from this well is part of a blended system that services the entire population of Sunnyvale. Groundwater, however, provides only 25 percent of the drinking water used by the Sunnyvale system (ref 1).

The City of Mountain View operates municipal wells that draw from the third transmissive zone. Three of Mountain View's wells, Wells 18, 19, and 30, are located just two miles southwest of the LMSC site, with Well 18 being the closest at approximately 1.7 miles southwest of the site's southern boundary (ref 1).

LMSC Site Groundwater Characterization: 1987 - present

In response to a March 5, 1987, request from the RWQCB, LMSC initiated a site-wide groundwater investigation to determine the extent of groundwater contamination below the site. Groundwater characterization was conducted in three phases, beginning in September 1987. The results of Phase I of the groundwater characterization investigation were used to identify contaminant distributions and to identify the locations for installation of monitoring wells to delineate the lateral extent of the groundwater contamination in the first transmissive zone. Based on the results of these initial investigations, the RWQCB issued Order No. 88-013, on January 20, 1988, requiring further investigation to determine the extent of contamination. Phases II and III were performed to more fully delineate the extent of groundwater contamination, laterally and vertically. Site-wide groundwater characterization was completed in 1990. On December 6, 2000, the RWQCB rescinded Order No. 88-013 and issued Order No. 00-124 which: 1) established cleanup standards for groundwater contamination that exists at the Site due to facility operations; 2) establishes requirements for evaluating the effectiveness of the final remedy for cleaning up the groundwater plumes; and 3) implemented an expanded sampling schedule, which is outlined in LMSC's self monitoring plan (SMP). This plan requires quarterly monitoring at 11 extraction wells and semi-annual monitoring of potentiometric surface elevations at 87 monitoring wells (refs 2, 26).

Contaminant Plumes and Groundwater Extraction System

Characterization efforts reveal several chemical contaminants in the first and second transmissive zones including:

- VOCs, primarily TCA and TCE, but also PCE, DCE (1,1- DCE and cis- 1,2-DCE), chloroform, and trichlorofluoromethane (TCFM)
- 1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)
- Hexavalent chromium
- Nitrate
- Bromodichloromethane (BDCM) (refs 8, 26, 35).

A groundwater extraction system was installed in 1992 to prevent or minimize the amount of contaminated groundwater migrating off site.

Groundwater Flow

Prior to installation of a groundwater extraction system in 1992, the groundwater flow beneath the site moved toward the northeast at a velocity of about 3.6 feet per day, with a more eastward component in the area north of Building 170 (refs 23, 26).

Groundwater flow direction remains to the northeast except in the vicinity of Buildings 170 and 178, where the groundwater extraction systems radically impact groundwater flow. Groundwater flow patterns have remained consistent since the groundwater extraction system was installed (ref 26).

Hydraulic Gradient

The hydraulic gradient in the first two zones is between 0.006 and 0.007 feet per foot (ft/ft) in the southern portion of the site and between 0.002 and 0.003 ft/ft in the northern area of the site. Based on limited data, the average hydraulic gradient in the third transmissive zone is approximately 0.0009 ft/ft (ref 26).

Hydraulic Interconnection and Migration of Contaminants

Hydrologic and water quality data suggest that the thickness and depth of the layer that separates the first and second transmissive zone differs significantly across the site. However, the first and second transmissive zone appear to be hydraulically interconnected over much of the LMSC site. Some saltwater intrusion from the San Francisco Bay has been noted in these zones (refs 5, 26).

Materials encountered between the second and the third transmissive zone, at depths between 55 and 100 feet bgs, consist mainly of low permeability materials. These lenses are saturated and have the potential to provide a possible lateral migration pathway for chemicals (ref 1). The potential for migration of contaminants from the first two transmissive zones to the third is also limited by the upward hydraulic gradient between the second and third transmissive zone.

Although, a hydraulic separation may exist between the interconnected uppermost zones and the third zone, there are documented instances where old irrigation wells have provided a conduit for contaminant migration to the third transmissive zone within two miles of the LMSC site.

Municipal Wells

The City of Sunnyvale, population 118,000, uses several local groundwater wells to supplement water obtained from the Hetch-Hetchy Reservoir in the Santa Clara Valley Water District. The closest of these nine wells is located 1.5 miles south of the southern

is overlain by Cretaceous and Tertiary marine, continental and igneous deposits, and topped by the alluvial sediments described above (ref 23).

Local Geology

Upper sediment layers in the vicinity of the LMSC site are characterized by a shallow vadose zone, underlain by the heavy and relatively impermeable Alviso clay, which is synonymous with the bay mud. This clay layer typically consists of six to ten inches of dark gray calcareous, very alkaline clay. The surface soil transitions into dark grayish-brown, calcareous subsoil of fine clay texture. Lime content increases with depth in the subsoil and is present throughout the surface soil. Below the dark upper clay layer is a lighter grey, fine, highly calcareous layer that contains brown, blue, and green mottles. The soil has a high void ratio in the range of 2 to 3 with a porosity of about 60 percent, and water content of approximately 100 percent. The dry unit weight of the soil is approximately 40 pounds. Laboratory testing of undisturbed soil indicates that the clays exhibit low plasticity and permeability of 10^{-7} to 10^{-8} centimeters/second. Groundwater is typically encountered between four and ten feet bgs (refs 3, 5, 19, 23).

5.3 Hydrology

Surface water and groundwater move primarily from the highlands surrounding the valley toward the San Francisco Bay (ref 23).

5.3.1 Groundwater

Water Bearing Zones

Three water-bearing zones exist below the LMSC site:

- The first transmissive zone spans from 5 to 25 feet bgs and is generally composed of five to ten feet thick sequences of moderately to highly conductive materials interbedded with thin lenses of less conductive materials. Groundwater in this zone has been impacted by facility operations. The primary contaminants are volatile organic compounds (VOCs) (e.g., TCE) and metals (e.g., chromium) (ref 26).
- The second transmissive zone is located at a depth interval of 25 to 55 feet bgs and is characterized by 5 to 15 feet thick sequences of moderately to highly conductive materials in less conductive materials. Groundwater in this zone has also been impacted by facility operations. The primary contaminants are VOCs (e.g., TCE) and metals (e.g., chromium) (ref 26).
- The third transmissive zone is located 100 to 160 feet bgs and provides high quality water.

5.0 ENVIRONMENTAL SETTING

The LMSC facility is located in the central portion of the Santa Clara Valley. The valley is bounded the Santa Cruz mountains to the west and the Diablo Range mountains to the east (ref 23).

5.1 Topography

The site slopes gently and uniformly downward from 30 feet at the south end of the facility to the north boundary levee at four feet mean sea level (MSL). The average slope gradient is approximately 0.8 percent (refs 7, 20).

5.2 Geology

Regional Geology

The LMSC facility lies on approximately 1,000 feet of unconsolidated alluvial sediments deposited during the Quaternary Period, underlain by the Santa Clara Formation of Plio-Pleistocene age (refs 5, 23, 25).

The Quaternary alluvium extends from a few feet to 200 feet and is generally unconsolidated, composed predominantly of sand, silt, and clay with minor gravel lenses. The valley alluvial fans are dissected by stream channels. Many of these stream channels are now buried, forming various preferential conduits for the movement of groundwater (refs 5, 23, 25).

The Santa Clara Formation was formed as a continental deposit and grain size ranges from clay particles to boulders. The formation consists of interbedded non-marine conglomerates, sandstone, and claystone (refs 5, 23).

Vast accumulation of sediments has resulted from movement and tectonic downwarping along two major fault zones located on each side of the Santa Clara Valley. The San Andreas fault passes ten miles to the southwest of the LMSC facility; the San Gregorio fault lies about 23 miles to the southwest. Along the eastern side of the Santa Clara Valley are two active faults, the Hayward and Sunol faults, which lie eight and 12 miles northeast of the LMSC facility, respectively. Several smaller but potentially active faults exist in the Santa Clara Valley but do not appear to contribute significantly to seismic hazard. These faults include the Silver Creek, Santa Clara, Crosley, Coyote Creek, Quimby, Berryessa, Piercy, Cascade, and Edenville faults. Metasedimentary, igneous, and metamorphic bedrock of the Jurassic Franciscan Group and Knoxville Formations underlie the Santa Clara Valley at depth. Older bedrock in the area has been highly deformed and fractured by folding and faulting. The bedrock

Date	Compliance/Permitting Activity
December 6, 2000	RWQCB issued order No. 00-124. The purpose of this order was to: 1) establish cleanup standards for groundwater contamination that exist at the site, and 2) establish requirements for evaluating the effectiveness of the final remedy at cleaning up groundwater contamination. Order No. 00-124 updates site cleanup requirements that were adopted in Regional Board Order No. 88-013 on January 20, 1988 (ref 35).

4.2 Voluntary Actions

LMSC first installed groundwater monitoring wells at the facility in 1969; however, it is unclear whether this monitoring was requested by a state or local regulating agency (ref 2).

Date	Compliance/Permitting Activity
July 24, 1991	DTSC issued a letter clarifying the permit status of Lockheed. DTSC requested revised Part A and B permit applications be submitted for the cyanide destruction unit at Building 114 and the hazardous waste storage tanks.
September 15, 1991	DTSC requested that a revised Part A and B application for the cyanide destruction units at Building 114 and the hazardous waste storage tanks be submitted on or before this date.
June 6, 1991	DHS acknowledged closure of the hazardous waste line at Building 071.
February 1992	Lockheed filed its initial notification with DTSC of its intent to operate fixed treatment units under Permit by Rule (PBR) for neutralization and demineralization. PBR notification was required by April 1992 since the variance expired on January 1, 1993, or upon promulgation of PBR, whichever occurred first.
March 26, 1993	Lockheed submitted another notification to operate under Tiered Permitting. The notification indicated that Lockheed had three PBR units (HMPU, Neutralization Unit at Building 71, and Neutralization Unit at Building 113) and one Conditionally Exempt Specified Wastestream Unit (Demineralizer at Building 174).
July 29, 1993	DTSC authorized Lockheed to operate the following fixed treatment units (HMPU, Neutralization Unit at Building 71, and Neutralization Unit at Building 113).
January 1994	Lockheed closed (under tiered permit authority) the Building 113 Neutralization Unit.
March 20, 1996	Lockheed submitted to DTSC closure certifications for the Building 114 HMPU and the Building 71 Neutralization Unit. With that closure, Lockheed was no longer operating under the DTSC tiered permitting.

Date	Compliance/Permitting Activity
September 8, 1988	Lockheed applied for a modification to the Building 113 ENU variance to allow the treatment of other acids, caustics, and oxidizers (ref 1).
November 3, 1988	DHS denied the ENU variance modification request (ref 1).
May 18, 1989	Lockheed submitted a revised Part B Application for modification of the Hazardous Waste Treatment Facility, including the new hazardous waste storage tanks, at Building 071.
June 21, 1989	RWQCB adopted Order No. 89-106, requiring Lockheed to initiate a groundwater self-monitoring program. This order replaced Order 81-67.
January 1990	BAAQMD conducted an audit at the facility (ref 1).
May 17, 1990	Lockheed requested a variance of hazardous waste permit requirements from DHS for the storage of hazardous waste in tanks and containers at Building 071 for greater than 90 days, and treatment of hazardous waste at Building 114 (electrochemical and physical treatment in the Andco treatment unit; upgrade of the HMPU; and cyanide destruction in the cyanide destruction unit).
June 19, 1990	DHS issued a variance for treatment in the Andco treatment unit and the upgrading of the HMPU at Building 114. The requests for storage of hazardous waste in tanks and containers at Bldg 071 for greater than 90 days, and cyanide destruction in the cyanide destruction unit at Building 114 were denied. The March 10, 1997, permit was terminated by issue of this variance.
November 6, 1990	Lockheed requested a modification to the variance from DHS for elementary neutralization of wastewater at Building 114.
March 4, 1991	DHS granted this modification to the variance for elementary neutralization of wastewater.
April 1, 1991	Lockheed submitted a revised Part A and B permit application with modified pages for the completion of the cyanide destruction unit at Building 114.

Date	Compliance/Permitting Activity
March 10, 1987	DHS issued Lockheed a five-year California (non-RCRA) Hazardous Waste Facility Permit to operate the Andco treatment unit at Building 114 (which included transfer lines from Buildings 071, 103, 150, 151, 159, 170, and 182). By the issuance of this permit, the Operation Plan dated July 18, 1986, and amended on October 1986 was approved.
July 31, 1987	DHS certified clean closure of the two hazardous waste surface impoundments (ref 2).
September 25, 1987	A Consent Agreement and Order was issued for administrative violations related to hazardous waste management activities (ref 1).
October 26, 1987	DHS granted a treatment variance for the neutralization unit at Building 113. Due to a discrepancy in the unit's effluent discharge, the variance was rescinded, and a new variance was issued on March 17, 1988. In September 1988, Lockheed applied for a modification of the variance to include other acids, caustics, and oxidizers. The modification request was denied.
January 20, 1988	RWQCB adopted Site Cleanup Requirements, Order No. 88-13. The order identified Lockheed as the sole discharger at the site, required Lockheed to characterize the geology and hydrology of the site, and define the extent of soil and groundwater contamination (refs 1, 2).
February 22 – 23, 1988	DHS conducted an inspection. The following violations were found: <ul style="list-style-type: none"> • Hazardous waste drums outside of Buildings 187 and 151 were open, or not properly closed • Administrative violations (ref 75).
March 17, 1988	DHS granted a treatment variance for an ENU to handle circuit board wastes in Building 113. DHS also granted a Research, Development, and Demonstration variance for a fluorescent light crusher (ref 1).
May 19, 1988	Lockheed applied with the DHS for a variance for a solvent recovery unit to be operated in Building 102. (This variance had not been granted as of 1990) (ref 1).
June 30, 1988	The DHS Research, Development, and Demonstration variance for the fluorescent light crusher expired (ref 1).

Date	Compliance/Permitting Activity
October 24, 1986	<p>DHS filed a Complaint for Civil Penalties (ref 91). Specifically, DHS alleged that Lockheed: 1) accepted hazardous waste materials from off site (2/1/85 – 12/17/85); 2) stored hazardous waste from off site (2/1/85 – 5/28/86); 3) operated the Andco treatment unit without a permit (10/85 – 12/85) in violation of HWCA Section 25201; 4) stored hazardous waste beryllium for greater than 90 days (11/7/85 – 8/19/86) in violation of HWCA Section 25201; 5) stored more than 5,000 gallons of beryllium in a single tank without a permit (1/1/86 – 8/12/86) in violation of HWCA Sections 25123.3 and 25201; 6) stored hazardous waste materials other than beryllium on site for over 90 days (5/21/85 – 5/20/86) in violation of HWCA Section 66508; and 7) operated a cyanide destruction unit, copper removal unit, steam cleaning sedimentation unit, air stripping unit, silver recovery unit, and chromium reduction unit without a permit, or determination that the treatment units do not produce hazardous waste (12/9/85 – 6/3/86) in violation of HWCA Section 25201 (ref 91).</p> <p>In addition, Lockheed failed to: 1) create and follow a waste analysis plan; 2) develop and submit a closure plan for the entire facility until June 26, 1986; 3) maintain records for any part of the facility; 4) correctly label hazardous waste containers; 5) close hazardous waste containers properly; 6) separate incompatible wastes; 7) develop and follow a schedule for inspecting equipment; 8) comply with hazardous waste training requirements; 9) have a contingency plan for its transfer facility (that stored wastes from off site), its Andco treatment facility, and its drum and tank storage areas; 10) maintain proper aisle space in its container storage area; 11) follow requirements for posting signs to warn of danger in the active portions of the facility; 12) keep or submit a closure cost estimate document at the facility; 13) file an annual report; 14) notify DHS of modifications of existing facilities; 15) develop and maintain an annual cost estimate of post-closure monitoring and maintenance; and 16) containerize five pieces of beryllium-contaminated ducting waste (refs 59, 91).</p>
November 3, 1986	Lockheed submitted a revised Part A for the CWTP located at Building 114.

Date	Compliance/Permitting Activity
November 8, 1985	Lockheed lost interim status for the two hazardous waste surface impoundments. However, Lockheed indicated that the waste that was in the evaporation ponds was treated and dewatered by September 30, 1985. Treatment was complete by October 30, 1985. Lockheed also indicated that the non-sewerable slurries and sludges were being disposed as hazardous waste to a Class I disposal facility (ref 48). (Note: The facility never mentioned that the hazardous waste was removed from the evaporation ponds and disposed, or that the surface impoundment was clean-closed prior to November 8, 1985. Because the facility had not yet clean-closed the surface impoundment, the unit was still holding a hazardous waste and could be considered in violation for storage of hazardous waste without a permit or interim status.)
January 14, 1986	DHS denied Lockheed's application for a variance for the Andco treatment unit (ref 43).
March 10, 1986	Lockheed submitted a revised Part A (ref 1). (Note: A revised Part A from 1986 was not found in the reference material.)
May 19, 1986	Lockheed applied for a variance from the storage requirements for 17,800 gallons of beryllium waste (ref 52).
May 28, 1986	DHS denied Lockheed's variance application for the beryllium storage requirements (ref 52).
May 29, 1986	The RWQCB and DHS conducted a compliance evaluation inspection (ref 38).
July 18, 1986	Lockheed submitted the Operation Plan for the CWTP located at Building 114.

Date	Compliance/Permitting Activity
July 24, 1984	DHS rescinded Lockheed's ISD for the CWTP based on the facility's assertion that this unit was covered under the definition of an elementary neutralization unit (ENU) (ref 2). The ISD for the two surface impoundments was retained.
August 24, 1984	DHS rescinded Lockheed's ISD requirements for tank and container operations based on Lockheed's assertion that it no longer stored hazardous wastes for more than 90 days. Lockheed's two surface impoundments (evaporation ponds) were the only remaining units regulated under the ISD (ref 91).
September 28, 1984	EPA formally requested Lockheed's RCRA Part B permit application for the facility's surface impoundments. (Note: Container and tank storage and treatment were regulated by DHS at the time that this letter was sent. Thus, U.S. EPA only requested Part B information about the surface impoundments (ref 42). The deadline cited in the formal request memorandum was April 1, 1985 (ref 42).
May 21, 1985	DHS inspection yielded several violations of California's Hazardous Waste Control Act (HWCA).
October 1985	Lockheed emptied the hazardous waste surface impoundments operated under the ISD and closure was initiated in 1986. DHS certified the surface impoundments clean closed on July 31, 1987. (EPA was notified of the closure approval at the same time).
October 20, 1985	Lockheed submitted a revised Part A for the Andco treatment unit located at Building 114.

Table 6: Permitting/Compliance History

Date	Compliance/Permitting Activity
1958	Lockheed manufacturing operations began (ref 1).
1976	RWQCB issued Lockheed National Pollutant Discharge Elimination System (NPDES) permit CA0005754, WDR Order No. 76-75, covering discharge of site runoff through four storm water channels to the Guadalupe Slough (ref 1).
August 18, 1980	Lockheed submitted Notification of Hazardous Waste Activity (ref 1).
November 19, 1980	Lockheed submitted Part A application for a Hazardous Waste Permit (EPA Form 3510-3) indicating tank and container storage, tank treatment, and incineration (ref 37).
1981	RWQCB issued Board Order 81-67, which required monitoring of the Process Wastewater Treatment and Reclamation Facility (PWTRF) (ref 81).
March 6, 1981	Lockheed was issued an interim status document (ISD) by DHS for treatment and storage in tanks, containers, and two surface impoundments.
April 17, 1981	Lockheed submitted a revised Part A (ref 41).
February 14, 1983	Lockheed requested rescission of ISD because it no longer considered itself a hazardous waste "facility." The facility asserted that it no longer stored hazardous waste on site for more than 90 days (ref 91).
November 15, 1983	The State of California (DTSC) conducted an overview inspection and found Lockheed in violation of container storage and closure plan requirements (ref 49).
February 29, 1984	The Toxic Substances Control Division of the DHS issued a notice of violation pursuant to Section 3008 of RCRA. The violations identified were primarily administrative and included violation of container maintenance and labeling requirements and closure plan specifications (ref 44).

4.0 REGULATORY INVOLVEMENT AND VOLUNTARY ACTIONS

The following federal, state, and local agencies are involved in regulatory oversight of the LMSC facility:

- U.S. EPA
- Department of Health Services (DHS)
- California RWQCB
- BAAQMD
- City of Sunnyvale (ref 1).

Limited information was available in the file material regarding regulation of air emission sources at the site. File materials indicate that BAAQMD issues permits for individual degreaser units and spray paint booths and is primarily concerned with solvent usage at the facility (ref 1).

In addition to state and federal regulations, LMSC is also subject to the City of Sunnyvale's municipal hazardous material storage and closure codes. These requirements are outlined in Titles 20 and 21 of the City of Sunnyvale's municipal hazardous material storage and closure codes and are enforced by the City of Sunnyvale Fire Prevention Bureau. LMSC currently holds the following two permits with the City of Sunnyvale for discharge to the POTW:

- A facility-wide permit that covers 98 buildings at the LMSC facility (twelve of these buildings have "long form" status because the wastewater may contain contaminants)
- A permit for direct discharge to the POTW from the Building 113 semiconductor operation (refs 1, 2).

In addition, LMSC historically held a permit for discharge of waste generated from the Building 195B metal finishing research operation (ref 1).

4.1 Compliance and Permit History

Table 6 provides a chronological history of compliance and permitting events associated with the facility.

Wastes Managed

The current status of this unit is unknown. During a DTSC inspection in 1995, LMSC indicated that this unit was intended to be decommissioned within a few months of the inspection (ref 100).

This unit would have required a RCRA permit. All of the hazardous waste from Building 071 was pumped into this unit. The types of hazardous waste handled by this unit included heavy metals (nickel, chromium, copper, zinc, lead), acidic and alkali wastewater, excess coating materials (paint), TCA, freons, and a mixture of solvents known as Alpha 565 (ref 100). Table 5 presents a complete list of the RCRA codes that apply to the wastes stored in this unit.

When this unit was full, the hazardous waste was manually transferred to the Former HMPU (SWMU 114-3) at Building 114 for treatment and disposal (ref 99).

Release Controls

The unit is located on a raised, epoxy-coated cement base and is surrounded by a berm. During a DTSC inspection in 1995, the inspectors indicated the secondary containment was cracked and peeling (ref 100).

History of Release

On October 24, 1991, lead- and chromium-contaminated soil was excavated and stockpiled from the vicinity of this unit. Confirmation sampling indicated that the remaining soil was nonhazardous (ref 2). There was no specific information pertaining to the source of the release or the quantity and concentration of the lead- and chromium-contaminated soil in the file material.

Remedial Actions

Lead and chromium contaminated soil was excavated in the vicinity of this unit on October 24, 1991 (ref 2).

Soil/Groundwater Release Potential

The past soil/groundwater release potential was moderate because the integrity of the secondary containment was found to be inadequate during the DTSC 1995 inspection.

The current release potential is unknown because it is unclear if the unit is still present and operating.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past and current release potential is unknown because it is unclear if this unit vented to the atmosphere.

6.3.6 SWMU 071-6: Wastewater Tank (T-113)

Unit Description

The Wastewater Tank (T-113) has a capacity of 10,000 gallons. T-113 is located behind Building 071 next to the Hazardous Waste Tank (T-115) (SWMU 071-5) (ref 100). There was no information in the file material pertaining to the unit's date of construction, material of construction, or dimensions.

Wastes Managed

The current status of this unit is unknown.

This unit would have required a RCRA permit. All of the aqueous hazardous waste from Building 071 was pumped into this unit. According to file material, wastewater stored in this unit was monitored for pH and specific conductivity. If the wastewater was determined to be hazardous [$\text{pH} < 3$, $\text{pH} > 11$, specific conductance $> 1,000$ ($\text{ohm}^{-1} \text{cm}^{-1}$)], then the waste was transferred to T-115 (SWMU 071-5). The types of hazardous waste handled in this unit included acidic and alkali wastewater (ref 100). Table 5 presents a complete list of the RCRA codes that apply to the wastes stored in this unit.

When this unit became full, the wastewater was discharged to the Surface Impoundment Clusters (SWMU Cluster 2: Holding Ponds) (ref 99).

Release Controls

The unit is located on a raised, epoxy-coated cement base and is surrounded by a berm. During a DTSC inspection in 1995, the inspectors indicated the secondary containment was cracked and peeling (ref 100).

History of Release

On October 24, 1991, lead- and chromium-contaminated soil was excavated and stockpiled from the vicinity of this unit. Confirmation sampling indicated that the remaining soil was nonhazardous (ref 2). There was no specific information pertaining to the source of the release or the quantity and concentration of the lead- and chromium- contaminated soil in the file material.

On July 14, 1994, one to ten gallons of acidic wastewater overflowed from this unit to the soil. The acidic wastewater had a pH of 2 (ref 107).

Remedial Actions

Lead- and chromium-contaminated soil was excavated in the vicinity of this unit on October 24, 1991 (ref 2).

LMSC planned to investigate and remediate the contaminated soil from the overflow of acidic wastewater (ref 107). There was no information in the file material as to whether LMSC remediated the contaminated soil.

Soil/Groundwater Release Potential

The past soil/groundwater release potential was moderate because the integrity of the secondary containment was found to be inadequate during the DTSC 1995 inspection.

The current release potential is unknown because it is unclear if the unit is still present at the site.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past and current release potential is unknown because it is unclear if this unit vented to the atmosphere.

6.3.7 SWMU 071-7: Carbon DesorberUnit Description

The carbon desorber collects vapors from the TCA Degreaser Unit (SWMU 071-3) (ref 100). There was no information in the file material pertaining to the unit's specific location, date of construction, material of construction or dimensions.

Wastes Managed

The current status of this unit is unknown. The carbon desorber collected the TCA vapors from the degreasing unit (SWMU 071-3). This unit would require a RCRA permit. The TCA waste is drummed and sent to Building 114 Hazardous Waste Container Storage Area (SWMU 114-5) for treatment and disposal (ref 100).

Release Controls

There was no information on the unit's release controls in the file material.

History of Release

On October 24, 1991, lead- and chromium-contaminated soil was excavated and stockpiled from the vicinity of this unit. Confirmation sampling indicated that the remaining soil was nonhazardous (ref 2). There was no specific information pertaining to the source of the release or the quantity and concentration of the lead- and chromium-contaminated soil in the file material.

Remedial Actions

Lead- and chromium-contaminated soil was excavated in the vicinity of this unit on October 24, 1991 (ref 2).

Soil/Groundwater Release Potential

The release potential is unknown because the integrity of this unit's secondary containment could not be determined from a review of the file material.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past and current release potential is unknown because it is unclear if this unit vented to the atmosphere.

6.4 BUILDING 076

Building 076 is located in the northwest corner of the facility (Figure 2).

The current status of the building could not be confirmed without conducting a VSI. However, the file material suggests that Building 076 was handling hazardous waste as of 2004 (ref 104).

6.4.1 SWMU 076-1: Spray Paint Booth (1)

See discussion of Spray Paint Booths in Section 6.1.2 (ref 1).

6.4.2 SWMU 076-2: Degreaser (1)

See discussion of Degreasers in Section 6.1.3 (ref 1).

6.5 BUILDING 102

Building 102 is located in the southeast portion of the facility on the corner of C Street and 8th Avenue, adjacent to Building 103 (Figure 2).

Building 102 was constructed in 1956 (ref 2). The current status of the building could not be confirmed without conducting a VSI. The file material suggests that Building 102 no longer handled hazardous waste as of 2004 (ref 104). However, Building 102 was handling hazardous waste as of 1997 (ref 105).

6.5.1 SWMU 102-1: Former Underground Vault

Unit Description

The Former Underground Vault was located outside on the south side of Building 102. The vault was constructed of concrete with an interior brick surface lining. The underground concrete vault was 8 feet in length by 2 feet in width by 4.5 feet in depth (ref 114). There was no information in the file material on the date of construction.

The underground vault had piping connected to a room inside Building 102 that was formerly dedicated to reproductive graphic services (ref 114).

Wastes Managed

The concrete vault, and all waste lines associated with this unit, were decommissioned on September 27, 1988. This unit would have required a RCRA permit. This unit handled photographic waste sludge and wastewater (ref 114). Table 5 presents a complete list of the RCRA codes that apply to the wastes stored in this unit.

Release Controls

There was no information on the unit's release controls in the file material.

History of Release

On February 18, 1987, there was a release of approximately ten gallons of TCA to the soil due to a faulty pressure relief valve (ref 115).

Remedial Actions

Soil samples were taken in the vicinity of the TCA spill by LMSC, and the results indicated that no further remediation was necessary (ref 2). However, there was no information in the file material suggesting the contaminated soil was ever excavated.

Soil/Groundwater Release Potential

The past release potential was moderate because it is unclear if the contaminated soil was ever excavated.

The current release potential is low due to the unit no longer being active.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past release potential was low because this unit was not open to the atmosphere.

The current release potential is low due to the unit no longer being active.

6.6 BUILDING 103

Building 103 is located in the south central portion of the facility on the corner of E Street and 8th Avenue, adjacent to Building 102 (Figure 2).

Building 103 was constructed in 1956 (ref 2). The current status of the building could not be confirmed without conducting a VSI. The file material suggests that Building 103 no longer handled hazardous waste as of 2004 (ref 104). However, Building 103 was handling hazardous waste as of 1997 (ref 105).

6.6.1 SWMU 103-1: Former Plating Area (1)

See discussion of Plating Areas in Section 6.1.1 (ref 1).

6.6.2 SWMU 103-2: Former Degreasers (4)

See discussion of Degreasers in Section 6.1.3 (ref 1).

6.6.3 SWMU 103-3: Former Spray Paint Booth (1)

See discussion of Spray Paint Booths in Section 6.1.2 (ref 1).

6.6.4 SWMU 103-4: Former Plating Waste Tanks (WT103-1 and WT103-2)Unit Description

The Former Plating Waste Tanks (WT103-1 and WT103-2) were located on the west side of Building 103 (ref 85). WT103-1 had a capacity of 7,000 gallons, and WT103-2 had a capacity of 5,000 gallons. Both WT103-1 and WT103-2 were underground, plastic-lined

tanks (ref 104). There was no information in the file material pertaining to the tanks' date of construction or dimensions.

Wastes Managed

The current status of tanks WT103-1 and WT103-2 is unknown. The tanks were used to manage plating wastes (ref 84). Plating operations include both electroplating and electroless plating with common and precious metals (refs 1, 2). WT103-1 and WT103-2 handled wastewater from these operations, which was typically acidic and contained concentrations of heavy metals such as chromium VI, copper, nickel, lead, iron, and zinc (ref 2). Table 5 presents a complete list of the RCRA codes that apply to the wastes stored in this unit.

Release Controls

WT103-2 had secondary containment (ref 85). There was no specific release control information for WT103-1 and WT103-2 in the file material.

History of Release

On July 20, 1988, approximately 1,500 gallons of chromium-containing wastewater were discharged from WT103-2 to an abandoned sanitary line. LMSC estimated that approximately 4.4 pounds of chrome were discharged (ref 84).

On November 23, 1988, as the tank was to be emptied, the hosing coupling failed, and the contents of the tank flowed into the tanks secondary containment system. Approximately 200 gallons splashed out of the secondary containment onto the surrounding asphalt (ref 85). File material did not indicate from which tank this spill occurred (e.g., WT103-1, WT103-2, or WT103-4).

On April 11, 1990, WT103-2 overflowed into the secondary containment (ref 87).

Remedial Actions

Based on the review of file material, no remedial activities are known to have taken place at either tank.

Soil/Groundwater Release Potential

The past release potential was moderate because the integrity of the secondary containment could not be determined in the file material.

The current release potential is unknown because the status of this unit is unclear.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past and current release potential is unknown because it is unclear if this unit vented to the atmosphere.

6.6.5 SWMU 103-5: Former Hazardous Waste Tanks (WT103-4 and RW103-5)

Unit Description

WT103-4 had a capacity of 500 gallons and RW103-5 had a capacity of 560 gallons. Both WT103-4 and RW103-5 were underground, plastic-lined tanks (ref 104). There was no information in the file material pertaining to the specific locations, date of construction, or dimensions of the units.

Wastes Managed

The current status of tanks WT103-4 and RW103-5 is unknown. The tanks were used to manage plating wastes (ref 84). Plating operations include both electroplating and electroless plating with common and precious metals (refs 1, 2). WT103-4 and RW103-5 handled wastewaters from these operations, which were typically acidic and contained concentrations of heavy metals such as chromium VI, copper, nickel, lead, iron, and zinc (ref 2). Table 5 presents a complete list of the RCRA codes that apply to the wastes stored in this unit.

Release Controls

There was no information on this unit's release controls in the file material.

History of Release

On November 23, 1988, as the tank was to be emptied, the hosing coupling failed and the contents of the tank flowed into the tanks secondary containment system. Approximately 200 gallons splashed out of the secondary containment onto the

surrounding asphalt (ref 85). File material did not indicate from which tank this spill occurred (e.g., WT103-1, WT103-2, or WT103-4).

On January 3, 1990, a waste transfer line from WT103-4 was accidentally hit, and two gallons of waste liquid were released to the pavement. The waste liquid was cleaned up and placed into WT103-3 (ref 86).

Remedial Actions

No remedial activities are known to have taken place at either tank.

Soil/Groundwater Release Potential

The past release potential was moderate because the integrity of the secondary containment could not be determined in the file material.

The current release potential is unknown because the status of this unit is unclear.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past and current release potential is unknown because it is unclear if this unit vented to the atmosphere.

6.6.6 SWMU 103-6: Former Waste Oil Tank (WO103-CO1)

Unit Description

The Former Waste Oil Tank (WO103-CO1) was an aboveground steel tank with a 3,000-gallon capacity (ref 104). There was no information in the file material pertaining to the unit's specific location, date of construction, or dimensions.

Wastes Managed

The current status of this unit is unknown. There was no information in the file material indicating the origin of the waste oil at the facility.

Release Controls

There was no information on this unit's release controls in the file material.

History of Release

There was no specific information in the file material regarding the history of release from this unit.

Remedial Actions

No remedial activities are known to have taken place at this unit.

Soil/Groundwater Release Potential

The past release potential is unknown because the integrity of this unit's secondary containment could not be determined in the file material.

The current release potential is low because the unit is no longer present.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past release potential is unknown because it is unclear if this unit vented to the atmosphere.

The current release potential is low because the unit is no longer present.

6.6.7 SWMU 103-7: Former Baker TankUnit Description

The Former Baker Tank was located at the northwest corner of the parking lot west of Building 103 (ref 92). There was no information in the file material pertaining to the unit's capacity, date of construction, material of construction, or dimensions.

Wastes Managed

The current status of this unit is unknown. This unit would have required a RCRA permit. The Former Baker Tank was used to store acidic wastewater from decontamination of equipment that had been removed from Building 103 during renovation activities (ref 92). Table 5 presents a complete list of the RCRA codes that apply to the wastes stored in this unit.

Release Controls

There was no information on this unit's release controls in the file material.

History of Release

There was no specific information in the file material regarding the history of release from this unit.

Remedial Actions

No remedial activities are known to have taken place at this unit.

Soil/Groundwater Release Potential

The past release potential is unknown because the integrity of this unit's secondary containment could not be determined from the file material.

The current release potential is low because the unit is no longer present.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past release potential is unknown because it is unclear if this unit vented to the atmosphere.

The current release potential is low because the unit is no longer present.

6.7 BUILDING 104

Building 104 is located on the corner of Lockheed Way and Moffett Park Drive (Figure 2).

The current status of the building could not be confirmed without conducting a VSI. The file material suggests that Building 104 no longer handled hazardous waste as of 2004 (ref 104). However, Building 104 was handling hazardous waste as of 1997 (ref 105).

6.7.1 AOC 104-01: Soil Contamination Area 1

During demolition of a concrete slab in Building 104 in early 2000, chemical odors were noted (Figure 8). Surface soil sampling was conducted, and biphenyl (21.0 mg/kg) and diphenyl ether were detected. Additional soil sampling was conducted, resulting in the removal of 225 cubic yards of soil. Confirmation samples collected from the bottom of the excavation all contained less than 350 mg/kg of biphenyl and diphenyl ether (ref 88).

6.7.2 AOC 104-2: Soil Contamination Area 2

During excavation activities in Building 104 in early 2000, chemical odors were noted, and four cubic yards of soil were excavated (Figure 8). The soil was analyzed and found to contain Stoddard solvent and 1,3,5-trimethylbenzene. A concrete structure was removed along with additional soil. Additional sampling and excavation resulted in the removal of an additional 90 cubic yards of soil. Confirmation samples, collected through backfill in the excavated area using Geoprobes, did not contain detectable levels of Stoddard solvent or 1,3,5-trimethylbenzene (ref 88).

6.8 BUILDING 109

Building 109 is located in the south central portion of the facility on the corner of C Street and 8th Avenue, adjacent to Building 103 (Figure 2).

The current status of the building could not be confirmed without conducting a VSI. The file material suggests that Building 109 was handling hazardous waste as of 2004 (ref 104).

6.8.1 SWMU 109-1: Waste Oil Tank 109

Unit Description

Waste Oil Tank 109 was a mild steel-coated tank with a capacity of 1,200-gallons (ref 116). There was no information in the file material pertaining to the unit's date of construction, dimensions and whether the tank was above or below the ground surface.

Wastes Managed

Waste Oil Tank 109 was removed in 1985 (ref 116). There was no information in the file material about the origin of the waste oil at the facility.

Release Controls

There was no information on this unit's release controls in the file material.

History of Release

There was no information on this unit's release history in the file material.

Remedial Actions

No remedial activities are known to have taken place at this unit.

Soil/Groundwater Release Potential

The past and current release potential is unknown because the integrity of this unit's secondary containment could not be determined in the file material.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past and current release potential is unknown because it is unclear if this unit vented to the atmosphere.

6.8.2 AOC 109-1: Former Underground Storage Tanks (4)

There were four, 10,000-gallon USTs at the service station associated with Building 109. Three of the tanks held regular, unleaded gasoline and the fourth tank held diesel. Groundwater monitoring wells were installed in 1985, and samples collected in August 1988 contained benzene and total petroleum hydrocarbons. Integrity testing performed in September 1988 indicated that two of the gas tanks and the diesel tank had failed. In January 1989, all four tanks were removed (ref 13).

During tank removal, soil contamination was noted. Soil and groundwater sampling was conducted. Additional excavation and sampling was proposed in 1990 (ref 13). The extent of soil contamination had not been determined, but groundwater consistently reported a lack of contamination.

6.9 BUILDING 113

Building 113 is located in the south central portion of the facility on the corner of C Street and 11th Avenue, adjacent to Building 150 (Figure 2).

The current status of the building could not be confirmed without conducting a VSI. The file material suggests that Building 113 was handling hazardous waste as of 2004 (ref 104).

6.9.1 SWMU 113-1: Degreasers (4)

See discussion of Degreasers in Section 6.1.3 (ref 1).

6.9.2 SWMU 113-2: Former Neutralization Unit

Unit Description

The Former Neutralization Unit used sulfuric acid, a caustic, to adjust the pH of incoming wastewater (ref 100). The unit was constructed of concrete (ref 2). There was no information in the file material pertaining to date of construction or dimensions.

Wastes Managed

This unit was shutdown in January 1994. The unit managed wastewater from circuit board operations (ref 2). Following neutralization, the waste, which was generated from printed circuit board manufacturing, was discharged directly to the city sewer (POTW) (ref 2). Approximately 200,000 gallons of wastewater was treated in this unit per month (ref 106).

Release Controls

The Neutralization Unit was surrounded by a berm (ref 2).

History of Release

There was no information on this unit's release history in the file material.

Remedial Actions

No remedial activities are known to have taken place at this unit.

Soil/Groundwater Release Potential

The past release potential is unknown because the integrity of this unit's secondary containment could not be determined in the file material.

The current release potential is low because the unit is no longer present.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past and current release potential is unknown because it is unclear if this unit vented to the atmosphere.

The current release potential is low because the unit is no longer present.

6.9.3 SWMU 113-3: Hazardous Waste Tanks (WT113-1 and WT113-2)Unit Description

There was no information in the file material pertaining to this unit's location, date of construction, capacity, dimensions, and whether the tanks were above or below the ground surface.

Wastes Managed

The current status of this unit is unknown. WT113-1 and WT113-2 were used to store wastewater which contained hydrofluoric acid (ref 98). Table 5 presents a complete list of the RCRA codes that apply to the wastes stored in this unit.

Release Controls

There was no information on this unit's release controls in the file material.

History of Release

There was no information on this unit's release history in the file material.

Remedial Actions

No remedial activities are known to have taken place at either tank.

Soil/Groundwater Release Potential

The past and current release potential is unknown because the integrity of this unit's secondary containment could not be determined in the file material.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past and current release potential is unknown because it is unclear if this unit vented to the atmosphere.

6.10 BUILDING 114

Building 114 is located in the north central portion of the facility on the corner of F Street and 1st Avenue, adjacent to the Surface Impoundment Clusters (Figure 2).

The current status of the building could not be confirmed without conducting a VSI. The file material suggests that Building 114 was handling hazardous waste as of 2004 (ref 104).

6.10.1 SWMU 114-1: Former Andco Treatment Unit

Unit Description

The formerly-operated Andco treatment unit was the first stage of pre-treatment for rinsewaters, wastewaters, and other process-related solutions generated during operations in Buildings 071, 103, 150, 151, 159, 170, and 182. Pre-treatment activities included: 1) neutralization of liquid corrosive metals, and 2) electrochemical reduction of hexavalent chromium to trivalent chromium (refs 1, 2). The unit was designed to process 50 gallons of liquids per minute in a batch mode, or 10,000 to 30,000 gallons per week, and treatment processes generated a stable metal hydroxide sludge in the amount of 0.25 cubic yards per month (ref 9).

Waste transfer pipelines from Buildings 071, 103, 150, 151, 159, 170, and 182 transferred waste to the former Andco treatment unit (refs 7,20,38). Two 13,000-gallon aboveground storage tanks (ASTs) contained bulk raw material (caustic soda and sulfuric acid) used for pH adjustment, and there was one feed tank for pH adjustment (refs 1, 2).

After neutralization and chromium reduction in the Andco unit, the wastewater from the unit was routed to the clarifier/sludge thickening tank/filter press (SWMU 114-2). Sludges generated from the Andco treatment unit were transferred to a less than 90-day container storage area (refs 1, 2).

The Andco unit began operation in 1986, and DHS granted a treatment variance for the unit on June 19, 1990. DTSC granted closure to LMSC for this unit on May 14, 1996 (ref 2).

Wastes Managed

The Andco treatment unit pre-treated the following waste streams:

- Metal bearing wastewater streams
- Acidic or alkaline wastes not containing metals
- Metal-bearing sludge produced through treatment of wastewaters
- Spent or off-specification process solutions
- Small quantities of laboratory waste
- Small quantities of periodic maintenance wastes (ref 38).

Etching chemical milling and plating wastes accounted for the majority of waste. Title 40 waste codes handled in the course of the wastewater treatment train included:

- D002 (corrosive)
- D006 (toxic for cadmium content)
- D007 (toxic for chromium content)
- D008 (toxic for lead content)
- D011 (toxic for silver content)
- F006, F007, F008, F009, F012, F019 (electroplating wastes) (ref 38).

The DHS 8022A Uniform Hazardous Waste Numbers for the wastes handled are: 121, 122, 131, 132, 171, 541, 711, 722, 723, 726, 791, and 792 (ref 38).

Release Controls

Building 114 is sloped and diked to contain any spilled liquids and prevent run-on from outside the facility. Accumulated liquids were pumped to the waste storage tanks. The containment area had adequate capacity to contain liquids if tank failure occurred (ref 38).

History of Release

No information regarding the release history of this unit was found in the file material.

Remedial Actions

No remedial activities are known to have taken place at this unit.

Soil/Groundwater Release Potential

The past release potential is unknown because the integrity of this unit's secondary containment could not be determined in the file material.

The current release potential is low because the unit is no longer present.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past release potential is unknown because it is unclear if this unit vented to the atmosphere.

The current release potential is low because the unit is no longer present.

6.10.2 SWMU 114-2: Former Clarifier/Sludge Thickening Unit/Filter Press

Unit Description

This former unit was comprised of three tanks: the Clarifying Tank, the Thickening Tank, and the Filter Press. There was no information in the file material pertaining to the capacity and construction of the tanks.

The Clarifier/Sludge Thickening Unit/Filter Press unit accepted pre-treated wastewater from the Andco tank for separation of insoluble precipitates. The underflow from the Clarifier, which contained insoluble precipitate, was pumped to the Thickening Tank where insolubles were further precipitated. Underflow from the Thickening Tank was then pumped to the Filter Press where the final solids separation and concentration occurred (refs 2, 38).

The resulting filter cake of insoluble metal hydroxides was placed into lined drums. Effluent water from the unit was discharged to the equalization ponds. Operation of this unit began in 1986, and the unit was closed in 1996 (ref 2).

Wastes Managed

This unit was closed in 1996. The Clarifier/Filter Press unit managed pre-treated wastewater from the Andco unit (SWMU 114-1) and the HMPU (SWMU 114-3) for precipitation of solids, primarily metals. The Thickening Tank handled an alkaline metal hydroxide sludge (refs 2, 38).

Release Controls

Building 114 is sloped and diked to contain any spilled liquids and prevent run-on from outside the facility. The treatment unit was situated on steel-reinforced concrete, and the area was bermed with epoxy-coated concrete (ref 2).

History of Release

No information regarding the release history of this unit was found in the file material.

Remedial Actions

No remedial activities are known to have taken place at this unit.

Soil/Groundwater Release Potential

The past and current release potential is unknown because the integrity of this unit's secondary containment could not be determined in the file material.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past and current release potential is unknown because it is unclear if this unit vented to the atmosphere.

6.10.3 SWMU 114-3: Former HMPUUnit Description

The Former HMPU was constructed in October 1990. The unit consisted of three polyethylene 13,000-gallon ASTs. The unit also contained a 6,000-gallon aboveground primary reactor tank where hazardous waste underwent chemical reduction and pH adjustment. This unit was closed and dismantled in March 1996 (ref 2). There was no information in the file material pertaining to the unit's dimensions.

Wastes Managed

The unit was designed to treat plating waste, acidic and alkaline wastes, and spent or out-of-specification process solutions (ref 2). Table 5 presents a complete list of the RCRA codes that apply to the wastes stored in this unit.

Release Controls

Building 114 is sloped and diked to contain any spilled liquids and prevent run-on from outside the facility. The treatment unit was situated on steel-reinforced concrete, and the area was bermed with epoxy-coated concrete (refs 2, 38).

History of Release

No information regarding the release history of this unit was found in the file material.

Remedial Actions

No remedial activities are known to have taken place at this unit.

Soil/Groundwater Release Potential

The past and current release potential is unknown because the integrity of this unit's secondary containment could not be determined in the file material.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past and current release potential is unknown because it is unclear if the unit vented to the atmosphere.

6.10.4 SWMU 114-4: Former Cyanide Destruction UnitUnit Description

This unit was located on the east side of Building 114. The unit was intended to treat cyanide wastes generated from chemical processing operations, but it only operated once in 1990 to treat nonhazardous wastewater. This unit was decontaminated and closed in place in March 1996 (ref 2).

Wastes Managed

Waste used for the system test was not hazardous, but the quantity and types of waste are unclear (ref 2). Table 5 presents a complete list of the RCRA codes that apply to the wastes stored in this unit.

Release Controls

Building 114 is sloped and diked to contain any spilled liquids and prevent run-on from outside the facility. The treatment unit is situated on steel-reinforced concrete and the area was bermed with epoxy-coated concrete (refs 2, 38).

History of Release

No information regarding the release history of this unit was found in the file material.

Remedial Actions

No remedial activities are known to have taken place at this unit.

Soil/Groundwater Release Potential

The past and current release potential is low because this unit never became fully operational.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past and current release potential is low because the unit never became fully operational.

6.10.5 SWMU 114-5: Hazardous Waste Container Storage Area

Unit Description

The Hazardous Waste Container Storage Area was constructed in 1986 (ref 2). This unit is a roofed structure with open sides with the interior divided into cubicles. The unit primarily is used to store hazardous waste in 55-gallon drums (ref 117). There was no information in the file material pertaining to the unit's dimensions.

Wastes Managed

This unit is currently active and requires a RCRA permit. The hazardous wastes managed in this unit are typically generated as spent solutions from metal fabrications and electronics manufacturing (ref 117). Table 5 presents a complete list of the RCRA codes that apply to the wastes stored in this unit.

There was no specific information in the file material outlining the types of hazardous waste managed in the Hazardous Waste Container Storage Area.

Release Controls

Building 114 is sloped and diked to contain any spilled liquids and prevent run-on from outside the facility. The treatment unit is situated on steel-reinforced concrete, and the area was bermed with epoxy-coated concrete (refs 2, 38).

History of Release

No information regarding the release history of this unit was found in the file material.

Remedial Actions

No remedial activities are known to have taken place at this unit.

Soil/Groundwater Release Potential

The past and current release potential is unknown because the integrity of this unit's secondary containment could not be determined in the file material.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past and current release potential is unknown because it is unclear if the unit vented to the atmosphere.

6.11 BUILDING 130

Building 130 was located in the northeast portion of the facility on the corner of C Street and 1st Avenue, adjacent to Storm Ditch 002. It appears the building is no longer present (Figure 2).

The current status of the building could not be confirmed without conducting a VSI.

6.11.1 SWMU 130-1: Former Degreaser (1)

See discussion of Degreasers in Section 6.1.3 (ref 1).

6.12 BUILDING 132

Building 132 is located in the northern portion of the facility on F Street, adjacent to Building 168 (Figure 2).

The current status of the building could not be confirmed without conducting a VSI.

6.12.1 SWMU 132-1: Former Solvent Waste Drums

Unit Description

Building 132 may have stored solvent waste drums (ref 2). There is no information pertaining to the date of operation, material of construction, and dimensions of this unit.

Wastes Managed

The current status of this unit is unknown. Spent solvents (potential waste codes: F001-F005) may have been managed at this unit (ref 2). Table 5 presents a complete list of the RCRA codes that apply to the wastes stored in this unit.

Release Controls

Building 132 was previously surrounded by a berm (ref 2). There is no information in the file material indicating when the berm was removed.

History of Release

Petroleum hydrocarbons were detected at a concentration of 680 mg/kg at a depth of six inches bgs, and at less than 100 mg/kg at a depth of three feet bgs. Lead concentrations from hand auger and soil borings were measured at 120 mg/kg (ref 2).

Remedial Actions

No remedial activities are known to have taken place at this unit.

Soil/Groundwater Release Potential

The past release potential was high because of contamination in the soil, and it is not clear if remedial activities ever took place.

Current release potential is low because the unit is no longer present.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past and current release potential is unknown because it is unclear if the unit vented to the atmosphere.

6.13 BUILDING 136

Building 136 is located in the northern portion of the facility on F Street, adjacent to Building 168 (Figure 2).

The current status of the building could not be confirmed without conducting a VSI.

6.13.1 SWMU 136-1: Spray Paint Booth (1)

See discussion of Spray Paint Booths in Section 6.1.2.

6.14 BUILDING 138

Building 138 is located in the northwest portion of the facility (Figure 2).

The current status of the building could not be confirmed without conducting a VSI. Building 138 was handling hazardous waste as of 2004 (ref 104).

6.14.1 SWMU 138-1: Former Steam Cleaning Unit

Unit Description

The former steam cleaning unit was located in the Vehicle Maintenance Facility in Building 138 (ref 2). There was no information in the file material pertaining to the unit's date of construction, material of construction, or dimensions.

Wastes Managed

The steam cleaning unit was closed prior to 1987. The former steam cleaning unit was considered a potential source of grease, oil, and degreasing solvents (ref 2).

Release Controls

There was no information on this unit's release controls in the file material.

History of Release

No information regarding the release history of this unit was found in the file material.

Remedial Actions

No remedial activities are known to have taken place at this unit.

Soil/Groundwater Release Potential

The past and current release potential is unknown because the integrity of this unit's secondary containment could not be determined in the file material.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past and current release potential is unknown because it is unclear if the unit vented to the atmosphere.

6.15 BUILDING 140

The location of Building 140 is unclear based on the file material. The current status of the building could not be confirmed without conducting a VSI. Building 140 was handling hazardous waste as of 2004 (ref 104).

6.15.1 SWMU 140-1: Spray Paint Booth (1)

See discussion of Spray Paint Booths in Section 6.1.2 (ref 1).

6.15.2 SWMU 140-2: Waste Coolant Tank (WO140-1)Unit Description

The Waste Coolant Tank (WO140-1) is a 2,000-gallon aboveground plastic-lined tank. This unit collects waste from used equipment and titanium bore metal scraps from a

bermed 20 by 20 feet concrete pad. The liquid waste is fed into a collection sump which is pumped into the waste tank. There was information in the file material pertaining to the unit's date of construction or dimensions (ref 100).

Wastes Managed

The current status of the unit is unknown. This unit requires a RCRA permit. The unit handles waste oil and coolant from used equipment and titanium bore metal scraps (ref 100).

Release Controls

This unit rests on a 20 by 20 feet bermed concrete pad (ref 118).

History of Release

No information regarding the release history of this unit was found in the file material.

Remedial Actions

No remedial activities are known to have taken place at this unit.

Soil/Groundwater Release Potential

The past and current release potential is unknown because the integrity of this unit's secondary containment could not be determined in the file material.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past and current release potential is unknown because it is unclear if the unit vented to the atmosphere.

6.16 BUILDING 141

Building 141 is located in the south central portion of the facility on 5th Avenue, adjacent to Building 155 (Figure 2).

The current status of the building could not be confirmed without conducting a VSI. Building 141 was handling hazardous waste as of 2004 (ref 104).

6.16.1 SWMU 141-1: Spray Paint Booth (1)

See discussion of Spray Paint Booths in Section 6.1.2 (ref 1).

6.17 BUILDING 150

Building 150 is located in the southwest portion of the facility on the corner of Jagels Road and 11th Avenue, adjacent to Building 113 (Figure 2).

The current status of the building could not be confirmed without conducting a VSI. Building 150 was handling hazardous waste as of 2004 (ref 104).

6.17.1 SWMU 150-1: Plating Area (1)

See discussion of Plating Areas in Section 6.1.1 (ref 1).

6.17.2 SWMU 150-2: Spray Paint Booth (1)

See discussion of Spray Paint Booths in Section 6.1.2 (ref 1).

6.17.3 SWMU 150-3: Degreaser (1)

See discussion of Degreasers in Section 6.1.3 (ref 1).

6.17.4 SWMU 150-4: Former Waste Container Storage Area

Unit Description

The Former Waste Container Storage Area was located outside of Building 150 to the northeast. The unit consisted of a bermed concrete pad where approximately four 55-gallon drums of solvents were stored from 1984 – 1989. The concrete pad was removed, and the area was paved with asphalt (ref 119). There was no information in the file material pertaining to the unit's date of construction and dimensions.

Wastes Managed

This unit is no longer active, but would have required a RCRA permit. Table 5 presents a complete list of the RCRA codes that apply to the wastes stored in this unit.

Release Controls

The waste storage area was paved and bermed (ref 119).

History of Release

No information regarding the release history of this unit was found in the file material.

Remedial Actions

No remedial activities are known to have taken place at this unit.

Soil/Groundwater Release Potential

The past release potential is unknown because the integrity of this unit's secondary containment could not be determined from the file material.

The current release potential is low because the unit is no longer present.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past release potential is unknown because it is unclear if the unit vented to the atmosphere.

The current release potential is low because the unit is no longer present.

6.17.5 SWMU 150-5: Hazardous Waste Tanks (WT150-2 and WT150-3)Unit Description

Hazardous Waste Tanks WT150-2 and WT150-3 are underground plastic-lined tanks. Each tank has a 2,000-gallon capacity (ref 103). There was no information in the file material pertaining to this unit's specific location, date of construction, and dimensions.

Wastes Managed

The current status of this unit is unknown. This unit would require a RCRA permit. WT150-2 and WT150-3 are used to store plating rinse (ref 103). WT150-2 and WT150-3

handle wastewater that is typically acidic and contains concentrations of heavy metals such as chromium VI, copper, nickel, lead, iron, and zinc (ref 2). Table 5 presents a complete list of the RCRA codes that apply to the wastes stored in this unit.

Release Controls

There was no information on this unit's release controls in the file material.

History of Release

No information regarding the release history of this unit was found in the file material.

Remedial Actions

No remedial activities are known to have taken place at either tank.

Soil/Groundwater Release Potential

The past and current release potential is unknown because the integrity of this unit's secondary containment could not be determined from the file material.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past and current release potential is unknown because it is unclear if the units vented to the atmosphere.

6.18 BUILDING 151

Building 151 is located in the southwest portion of the facility on the corner of G Street and 8th Avenue, adjacent to Building 152 (Figure 2).

Building 151 was constructed in 1961 and was used for product assembly and testing (ref 2). The current status of the building could not be confirmed without conducting a VSI. Building 151 was handling hazardous waste as of 2004 (ref 104).

6.18.1 SWMU 151-1: Plating Area (1)

See discussion of Plating Areas in Section 6.1.1 (ref 1).

6.18.2 SWMU 151-2: Spray Paint Booths (7)

See discussion of Spray Paint Booths in Section 6.1.2 (ref 1).

6.18.3 SWMU 151-3: Degreasers (11)

See discussion of Degreasers in Section 6.1.3 (ref 1).

6.18.4 SWMU 151-4: Hazardous Waste Tanks (RW151-1 and WT151-2)Unit Description

Hazardous Waste Tanks RW151-1 and WT151-2 are underground concrete tanks. Tank RW151-1 has a 3,200-gallon capacity and tank WT151-2 has a 4,000-gallon capacity (ref 103). There was no information in the file material pertaining to this unit's specific location, date of construction, and dimensions.

Wastes Managed

The current status of this unit is unknown. This unit would require a RCRA permit. RW151-1 is used to store plating rinse (ref 103). WT151-2 is used to store plating shop waste. RW151-1 and WT151-2 handle wastewater that is typically acidic and contains concentrations of heavy metals such as chromium VI, copper, nickel, lead, iron, and zinc (ref 2). Table 5 presents a complete list of the RCRA codes that apply to the wastes stored in this unit.

Release Controls

There was no information on this unit's release controls in the file material.

History of Release

There was no information on this unit's release history in the file material.

Remedial Actions

No remedial activities are known to have taken place at either tank.

BOOZ ALLEN HAMILTONSoil/Groundwater Release Potential

The past and current release potential is unknown because the integrity of this unit's secondary containment could not be determined in the file material.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past and current release potential is unknown because it is unclear if this unit vented to the atmosphere.

6.18.5 SWMU 151-5: Former Waste Chemical Storage AreaUnit Description

The unit was located within Building 151 and was approximately 160 by 180 feet in size (refs 22, 120).

Wastes Managed

This unit was closed in November 1987 (ref 120). This unit would have required a RCRA permit. A diagram of the building indicates that approximately 150 drums of waste could be managed in the unit (ref 90). This area was used to store process equipment, product chemicals, and waste chemicals (ref 120). Table 5 presents a complete list of the RCRA codes that apply to the wastes stored in this unit.

Release Controls

The unit was located inside Building 151 (ref 22). There was no information in the file material pertaining to the building's floor construction material. In addition, file materials did not indicate whether the unit was bermed.

History of Release

Soil samples collected in the vicinity of the unit contained concentrations of TCA up to 3,000 ppb. Methylene chloride, acetone, 1,1-DCA, 1,1-DCE, trans-1,2-DCE, chloroform, 1,2-DCA, perchloroethane (PCA), TCE, and PCE were also detected in the vicinity of this unit (ref 22) (Figure 9).

Remedial Actions

The unit has been dismantled. Approximately 450 cubic yards of soil have been removed in the vicinity of this unit (ref 22).

Soil/Groundwater Release Potential

The past release potential was high due to the release to soil and groundwater from the unit.

The current release potential is low because the unit is no longer present.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past release potential is unknown because it is unclear if this unit vented to the atmosphere.

The current release potential is low because the unit is no longer present.

6.19 BUILDING 152

Building 152 is located in the southwest portion of the facility between C Street and E Street, adjacent to Building 151 (Figure 2).

The current status of the building could not be confirmed without conducting a VSI. Building 151 was handling hazardous waste as of 2004 (ref 104).

6.19.1 SWMU 152-1: Spray Paint Booths (2)

See discussion of Spray Paint Booths in Section 6.1.2 (ref 1).

6.19.2 SWMU 152-2: Hoist SumpUnit Description

The unit is located in the southeast portion of Building 152. The unit is approximately five feet below grade. A replacement for the hoist was installed in early 1989 (ref 91).

There was no information in the file material pertaining to this unit's date of construction, material of construction, capacity, and dimensions.

Wastes Managed

The current status of the unit is unknown. This unit requires a RCRA permit. The unit manages discharges from the hydraulic hoist (ref 91). There is no information in the file material regarding the amount of time the waste is stored in this unit.

Release Controls

The sump serves as a release control for hydraulic equipment.

History of Release

In January 1980, soil and groundwater sampling was performed. Soil samples contained a maximum of 28,400 ppm oil and grease, and groundwater contained 48,400 ppm oil and grease (ref 91).

Remedial Actions

No remedial activities are known to have taken place at this unit.

Soil/Groundwater Release Potential

The release potential is high because of oil and grease contamination to both the soil and groundwater.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The release potential is unknown because it is unclear if this unit vents to the atmosphere.

6.20 BUILDING 153

Building 153 is located in the center of the facility on the corner of E Street and 5th Avenue, adjacent to Building 182 (Figure 2).

The current status of the building could not be confirmed without conducting a VSI. Building 153 was handling hazardous waste as of 2004 (ref 104).

6.20.1 SWMU 153-1: Plating Area (1)

See discussion of Plating Areas in Section 6.1.1 (ref 1).

6.20.2 SWMU 153-2: Spray Paint Booths (5)

See discussion of Spray Paint Booths in Section 6.1.2 (ref 1).

6.20.3 SWMU 153-3: Degreasers (7)

See discussion of Degreasers in Section 6.1.3 (ref 1).

6.21 BUILDING 155

Building 155 is located in the center of the facility on the corner of E Street and 5th Avenue, adjacent to Building 153 (Figure 2).

The current status of the building could not be confirmed without conducting a VSI. Building 155 was handling hazardous waste as of 2004 (ref 104).

6.21.1 SWMU 155-1: Spray Paint Booth (1)

See discussion of Spray Paint Booths in Section 6.1.2 (ref 1).

6.22 BUILDING 159

Building 159 is located in the north central portion of the facility on the corner of C Street and 3rd Avenue, adjacent to Building 071 (Figure 2).

The current status of the building could not be confirmed without conducting a VSI. Building 159 was handling hazardous waste as of 2004 (ref 104).

6.22.1 SWMU 159-1: Spray Paint Booth (1)

See discussion of Spray Paint Booths in Section 6.1.2 (ref 1).

6.22.2 SWMU 159-2: Hazardous Waste Tanks (WT159-8 and WT159-9)

Unit Description

Hazardous Waste Tanks WT159-8 and WT159-9 are underground concrete tanks. Tank WT159-8 has a 4,800 gallon capacity, and tank WT159-9 has a 7,400 gallon capacity (ref 103). There was no information in the file material pertaining to this unit's specific location, date of construction, and dimensions.

Wastes Managed

The current status of this unit is unknown. This unit would require a RCRA permit. Both hazardous waste tanks are used to store metal process rinse (ref 103). This unit handles wastewater that is typically acidic and contains concentrations of heavy metals such as chromium VI, copper, nickel, lead, iron, and zinc (ref 2). Table 5 presents a complete list of the RCRA codes that apply to the wastes stored in this unit.

Release Controls

There was no information on this unit's release controls in the file material.

History of Release

A monitoring well was installed near one of the tanks in 1987. TCE (0.076 mg/L) and TCA (0.012 mg/L) were detected in groundwater samples (ref 2).

Remedial Actions

No remedial activities are known to have taken place at either tank.

Soil/Groundwater Release Potential

The past release potential to soil and groundwater was high due to contamination found in the vicinity of this unit.

The current release potential is unknown because the status of this unit is unclear.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past and current release potential is unknown because it is unclear if this unit vented to the atmosphere.

6.22.3 SWMU 159-3: Waste Oil Tank (WO159-4)Unit Description

Waste Oil Tank WO159-4 has a 1,500-gallon capacity and is an aboveground steel tank (ref 103). There was no information in the file material pertaining to the unit's date of construction and dimensions.

Wastes Managed

The current status of WO159-4 is unknown. WO159-4 is used to store waste oil and coolant. There was no information in the file material indicating the origin of the waste oil at the facility.

Release Controls

There was no information on this unit's release controls in the file material.

History of Release

A monitoring well was installed near one of the tanks in 1987. TCE (0.076 mg/L) and TCA (0.012 mg/L) were detected in groundwater samples (ref 2).

Remedial Actions

No remedial activities are known to have taken place at this unit.

Soil/Groundwater Release Potential

The past release potential to the soil and groundwater was high due to contamination found in the vicinity of this unit.

The current release potential is unknown because the current status of the unit is unclear.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past and current release potential is unknown because it is unclear if this unit vented to the atmosphere.

6.23 BUILDING 166

Building 166 is located in the southwest corner of the facility on 8th Street (Figure 2).

The current status of the building could not be confirmed without conducting a VSI.

6.23.1 AOC 166-1: Former Automotive Service Station

This former automotive service station existed in what is now the parking lot to Building 166. The years of operation and length of service of this unit were not found in the file materials (ref 2).

Three soil borings were completed in the former location of the service station. Total petroleum hydrocarbons were measured at 790 mg/kg. Groundwater samples collected in 1987 from downgradient monitoring well 151-5 contained benzene at less than 0.5 µg/L (ref 2).

6.24 BUILDING 170

Building 170 was located in the northeast portion of the facility on the corner of 2nd Avenue and Mathilda Avenue, adjacent to Building 153 (Figure 2).

The building was scheduled to be demolished in 1999 (ref 121). The current status of the building could not be confirmed without conducting a VSI. File materials suggest that Building 170 no longer handled hazardous waste as of 2004 (ref 104). However, Building 170 was handling hazardous waste as of 1997 (ref 105).

6.24.1 SWMU 170-1: Former Plating Area (1)

See discussion of Plating Areas in Section 6.1.1 (ref 1).

6.24.2 SWMU 170-2: Former Spray Paint Booths (4)

Information in the file material regarding the number of spray paint booths in Building 170 is unclear. See discussion of Spray Paint Booths in Section 6.1.2 (ref 1).

6.24.3 SWMU 170-3: Former Degreasers (2)

See discussion of Degreasers in Section 6.1.3 (ref 1).

6.24.4 SWMU 170-4: Former Waste Beryllium Tank (WT170-5)

Unit Description

The Former Waste Beryllium Tank (WT170-5) was an aboveground, plastic-lined tank with a 5,000-gallon capacity. There was no information in the file material pertaining to this unit's specific location, date of construction, and dimensions.

Wastes Managed

This unit is currently inactive. Tank WT170-5 would have required a RCRA permit. This unit was used to store beryllium wastes (refs 2, 52).

Release Controls

There was no information on this unit's release controls in the file material.

History of Release

There was no information on this unit's release history in the file material.

Remedial Actions

No remedial activities are known to have taken place at this unit.

Soil/Groundwater Release Potential

The past release potential is unknown because the integrity of this unit secondary containment could not be determined in the file material.

The current release potential is low because the unit is no longer present.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past release potential is unknown because it is unclear if this unit vented to the atmosphere.

The current release potential is low because the unit is no longer present.

6.24.5 SWMU 170-5: Former Bag House Dust AreaUnit Description

The former bag house dust area operated in Building 170. The bag house units are used to trap dust from metal working operations. As of 1995, LMSC no longer used beryllium metal in their working operations. Each bag house unit emptied into a 55-gallon drum (ref 100).

Wastes Managed

This unit is no longer active. This unit would have required a RCRA permit. As of 1991, this process generated approximately 80 to 110 gallons of beryllium waste per month (refs 2, 100).

Release Controls

There was no information on this unit's release controls in the file material.

History of Release

In October 1987, LMSC documented the release of one third of a pound of beryllium turnings and debris west of Building 170. Samples collected from the spill area contained 3.2 to 10.6 percent beryllium by weight. LMSC performed a series of excavations in this area (ref 2).

Remedial Actions

In 1998, during closure of Building 170, additional sampling and excavation were conducted until confirmation samples were within background levels (ref 2).

Soil/Groundwater Release Potential

The past release potential is high due to the documented release of beryllium waste.

The current release potential is low because the unit is no longer present.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past release potential is unknown because it is unclear if this unit vented to the atmosphere.

The current release potential is low because the unit is no longer present.

6.24.6 SWMU 170-6: Former Process Clarifiers (2) and Underground Sumps (4)Unit Description

Two large underground process clarifiers are located on the east side of Building 170. Four 10,000-gallon underground sumps are located between the two clarifiers. The sumps and clarifiers were operational from at least 1969 until 1998 (ref 2). There was no information in the file material pertaining to the size of this unit.

Wastes Managed

This unit is currently inactive. This unit would have required a RCRA permit. Sodium chloride and sodium nitrate were managed in this unit (ref 2).

Release Controls

There was no information on this unit's release controls in the file material.

History of Release

In 1969, LMSC installed five wells to determine the extent of clarifier solution contamination. Nitrate contamination was detected in groundwater. No information about levels of contamination or other contaminants was found in file materials. File information indicates that LMSC also sampled for beryllium and titanium from 1969 to 1972 (ref 2).

Between 1986 and 1987, groundwater data from monitoring wells downgradient from Building 170 indicated that VOCs and nitrates were present above maximum contaminant levels (MCLs). Contaminants detected included TCA at 66 $\mu\text{g/L}$, TCE at 567 $\mu\text{g/L}$, PCE at 48 $\mu\text{g/L}$, and nitrate at 346 mg/L (ref 2).

Remedial Actions

The clarifying units were withdrawn from service, cleaned, relined with plastic sealant, and reinforced with fiberglass following indications that clarifying solution was causing contamination. It is unclear when the clarifiers were removed from service (ref 2).

Soil/Groundwater Release Potential

The release potential was high due to the nitrate contamination detected in the soil and groundwater.

The current release potential is low because the unit no longer present.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past release potential is unknown because it is unclear if this unit vented to the atmosphere.

The current release potential is low because the unit is no longer present.

6.24.7 SWMU 170-7: Former Storm Ditch 002

Unit Description

Storm Ditch 002 is located approximately 50 feet northeast of Building 170. Surface drainage from the asphalt surface on the northeast side of Building 170 historically collected in a low area and was periodically released into Storm Ditch 002 (ref 2).

Storm Ditch 002 potentially flows into the wetlands on the north side of the site, adjacent to the wastewater equalization ponds. These wetlands flow into the Lockheed Channel which runs along the northern boundary of the site. The channel water is then regulated by the LMSC pump station located approximately 1,500 feet from the northeastern

boundary of the site, and is adjacent to the City of Sunnyvale landfill (Figure 2). Ultimately, water from the channel is pumped to the Guadalupe Slough at the southern boundary of San Francisco Bay (refs 1, 24). Sunnyvale granted clean closure to the Building 170 and Storm Ditch 002 area on July 27, 1999.

Wastes Managed

This unit is currently inactive. There is no information in the file material suggesting waste was managed in Storm Ditch 002.

Release Controls

There was no information on this unit's release controls in the file material.

History of Release

There was no information on this unit's release history in the file material.

Remedial Actions

Contamination at Storm Ditch 002 was characterized from 1987 to 1998, and contaminated soil was removed in 1987, 1988, 1990, and 1998 (ref 2).

In 1987, beryllium concentrations exceeding the total threshold limit concentrations (TTLC) were measured in three samples with concentrations of 200 mg/kg, 80 mg/kg, and 500 mg/kg, respectively. Fourteen cubic yards of soil were excavated, confirmation sampling was completed, and additional soil was excavated twice in 1988 (ref 2).

Hydrocarbon contamination at 460 mg/kg was detected at a depth of four inches bgs later in 1988. Metals contamination was detected reporting lead, cadmium, and zinc at concentrations of 350 mg/kg, 4.2 mg/kg, and 460 mg/kg, respectively. Additional soil was excavated as a result of the contamination discovered in 1988 (ref 2).

In 1990, soil samples detected additional beryllium contamination ranging from 0.46 to 1.9 (mg/l). Approximately 968 tons of soil were removed and disposed in 1998. Confirmation sampling indicates that beryllium concentrations were below TTLC, and total petroleum hydrocarbon (TPH) was below 100 mg/kg (ref 2).

Soil/Groundwater Release Potential

The past release potential was high due to contamination caused from working operations in Building 170.

The current release potential is low because the unit no longer is present.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past release potential is unknown because it is unclear if this unit vented to the atmosphere.

The current release potential is low because the unit is no longer present.

6.24.8 SWMU 170-8: Former Waste Oil Tank (WO170-WO)Unit Description

The 900-gallon aboveground waste oil tank was located on the east side of Building 170 (ref 103). The unit was constructed of steel. There was no information in the file material pertaining to the unit's dimensions.

Wastes Managed

The unit is currently inactive. This unit would have required a RCRA permit. The tank was used to store waste oil (ref 103).

Release Controls

There was no information on this unit's release controls in the file material.

History of Release

There was no information on this unit's release history in the file material.

Remedial Actions

No remedial activities are known to have taken place at this unit.

Soil/Groundwater Release Potential

The past release potential is unknown because the integrity of this unit's secondary containment could not be determined in the file material.

The current release potential is low because the unit is no longer present.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past release potential is unknown because it is unclear if this unit vented to the atmosphere.

The current release potential is low because the unit is no longer present.

6.24.9 SWMU 170-9: Hazardous Waste Tank (WT170-3)Unit Description

Waste Tank WT170-3 was an underground concrete tank with a 3,900-gallon capacity (ref 103). There was no information in the file material pertaining to this unit's specific location, date of construction, and dimensions.

Wastes Managed

This unit is currently inactive. This unit would require a RCRA permit. Waste Tank WT170-3 managed waste from the plating shop (ref 103). This unit handles wastewater that is typically acidic and contains concentrations of heavy metals such as chromium VI, copper, nickel, lead, iron, and zinc (ref 2). Table 5 presents a complete list of the RCRA codes that apply to the wastes stored in this unit.

Release Controls

There was no information on this unit's release controls in the file material.

History of Release

There was no information on this unit's release history in the file material.

Remedial Actions

No remedial activities are known to have taken place at this unit.

Soil/Groundwater Release Potential

The past release potential is unknown because the integrity of this unit's secondary containment could not be determined in the file material.

The current release potential is low because the unit is no longer present.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past release potential is unknown because it is unclear if this unit vented to the atmosphere.

The current release potential is low because the unit is no longer present.

6.25 BUILDING 171

Building 171 is located in the southwest portion of the facility on the corner of G Street and 1st Avenue, adjacent to Building 173 (Figure 2).

The current status of the building could not be confirmed without conducting a VSI. Building 171 was handling hazardous waste as of 2004 (ref 104).

6.25.1 SWMU 171-1: Incinerator

Unit Description

The incinerator was primarily used to dispose nonhazardous refuse at LMSC. This unit was included in the facility's 1980 Part A permit application; however, LMSC subsequently indicated that the unit was mistakenly identified as a hazardous waste unit, and should be considered a solid waste incinerator (ref 40). No indication of the years of operation was found in file materials (refs 37, 40, 59).

The process design capacity of the incinerator was 20 gallons per hour, according to the revised Part A permit application submitted on December 21, 1984, or one-ton per hour, according to the original Part A permit application (refs 37, 59).

Wastes Managed

According to LMSC, this incinerator was primarily used to combust general factory refuse such as waste paper and cardboard; however, the facility estimated roughly one quarter of one percent of the estimated total waste was characterized as a RCRA hazardous waste (ref 40).

The original Part A permit application indicated that the following amounts of hazardous waste were incinerated:

- 10 tons of D001 (Ignitable)
- 4 tons of D002 (Corrosive)
- 1 ton of D003 (Reactive) (ref 37).

Release Controls

There was no information on this unit's release controls in the file material.

History of Release

Ash from incinerator activities has been observed in a storm runoff drain south of Building 171 (ref 2).

Remedial Actions

No remedial activities are known to have taken place at this unit.

Soil/Groundwater Release Potential

The past and current release potential is unknown because the integrity of this unit's secondary containment could not be determined in the file material.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past and current release potential is unknown because it is unclear if this unit vented to the atmosphere.

6.26 BUILDING 174

Building 174 is located in the southwest portion of the facility on the corner of F Street and 1st Avenue, adjacent to Building 171 (Figure 2).

The current status of the building could not be confirmed without conducting a VSI. Building 174 was handling hazardous waste as of 2004 (ref 104).

6.26.1 SWMU 174-1: Spray Paint Booths (6)

See discussion of Spray Paint Booths in Section 6.1.2 (ref 1).

6.26.2 SWMU 174-2: Demineralizer

Unit Description

The Demineralizer is used to neutralize metal-bearing wastewater from metal finishing operations prior to pumping the wastewater to the Former HMPU (SWMU 114-3) at Building 114 (refs 100, 106).

There was no information in the file material regarding this unit's material of construction or dimensions.

Wastes Managed

The current status of this unit is unknown. A RCRA permit would be required to operate this unit. This unit treated approximately 10,000 gallons of wastewater per month as of 1993 (ref 106). The types of wastes handled by this unit included wastewater from metal finishing operations that were typically acidic and contained concentrations of heavy metals such as chromium VI, copper, nickel, lead, iron, and zinc (ref 2).

Release Controls

There was no information on the unit's release controls in the file material.

History of Release

There was no information on the unit's release history in the file material.

Remedial Actions

No remedial activities are known to have taken place at this unit.

Soil/Groundwater Release Potential

The past and current release potential is unknown because the integrity of this unit's secondary containment could not be determined in the file material.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past and current release potential is unknown because it is unclear if this unit vented to the atmosphere.

6.27 BUILDING 179

Building 179 is located in the central portion of the facility on 5th Avenue, on the south side of Building 182 (Figure 2).

The current status of the building could not be confirmed without conducting a VSI.

6.27.1 SWMU 179- 1: Metal Wastewater SumpUnit Description

The Metal Wastewater Sump is located at Building 179 and is constructed of concrete. The sump has a 600-gallon capacity and is unlined (ref 25). There was no information in the file material pertaining to the unit's date of construction and dimensions.

Wastes Managed

The current status of this unit is unknown. The unit receives overflow from the metals waste sumps at Building 182 (SWMU 182 - Metal Process Waste Sumps). The waste streams managed may include beryllium, chromium, caustics, acids, and solvents (TCE and TCA) (ref 25).

Release Controls

There was no information on the unit's release controls in the file material.

History of Release

There was no information on the unit's release history in the file material.

Remedial Actions

No remedial activities are known to have taken place at this unit.

Soil/Groundwater Release Potential

The past and current release potential is unknown because the integrity of this unit's secondary containment could not be determined in the file material.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past and current release potential is unknown because it is unclear if this unit vented to the atmosphere.

6.27.2 SWMU 179-2: Former Cyanide Destruction UnitUnit Description

This former unit was comprised of two mixing tanks, storage tanks, and a chlorine cylinder used in the treatment process. The unit began operating in 1983, and it was decommissioned in 1988 (ref 2).

Wastes Managed

The unit managed wastewater containing less than 5 mg/L cyanide (ref 2).

Release Controls

There was no information on the unit's release controls in the file material.

History of Release

Closure and post-closure information has been submitted to the City of Sunnyvale and DTSC. Closure was granted by DTSC on May 14, 1996 (ref 2).

Remedial Actions

No remedial activities are known to have taken place at this unit.

Soil/Groundwater Release Potential

The past release potential is unknown because the integrity of this unit's secondary containment could not be determined in the file material.

The current release potential is low because the unit no longer is present.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past release potential is unknown because it is unclear if this unit vented to the atmosphere.

The current release potential is low because the unit no longer is present.

6.27.3 SWMU 179-3: Baker TankUnit Description

The Baker Tank was located west of Building 103 and had a 5,000-gallon capacity (ref 92). There was no information in the file material pertaining to the date of construction,

material of construction, dimensions, and whether the tank was above or below the ground surface (ref 92).

Wastes Managed

The current status of this unit is unknown. This unit would have required a RCRA permit. The Baker Tank was used to store acidic and caustic wastewater from decontamination of equipment from the area (ref 92). Table 5 presents a complete list of the RCRA codes that apply to the wastes stored in this unit.

Release Controls

There was no information on this unit's release controls in the file material.

History of Release

There was no information on this unit's release history in the file material.

Remedial Actions

No remedial activities are known to have taken place at this unit.

Soil/Groundwater Release Potential

The past and current release potential is unknown because the integrity of this unit's secondary containment could not be determined in the file material.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past and current release potential is unknown because it is unclear if this unit vented to the atmosphere.

6.28 BUILDING 181

Building 181 is located in the east central portion of the facility on the corner of Mathilda Avenue and 5th Avenue, adjacent to Building 182 (Figure 2).

The current status of the building could not be confirmed without conducting a VSI. Building 181 was handling hazardous waste as of 2004 (ref 104).

6.28.1 SWMU 181-1: Spray Paint Booth (1)

See discussion of Spray Paint Booths in Section 6.1.2 (ref 1).

6.28.2 SWMU 181-2: Silver Retention Sump

Unit Description

This unit, comprised of three adjacent sumps connected by piping, is located south of Building 181. It covers an area of 6 feet by 13 feet by 5 feet. The unit is lined with bricks. It was hydroblasted in the late 1980s, and the walls were described as being in fair condition (ref 25).

Wastes Managed

The sump received wastes from the testing lab that was present in Building 181. Other wastes the sump may have received include photographic development chemicals, used hydraulic fluids, and solvents (ref 25).

Release Controls

There was no information on this unit's release controls in the file material.

History of Release

There was no information on this unit's release history in the file material.

Remedial Actions

No remedial activities are known to have taken place at this unit.

Soil/Groundwater Release Potential

The past and current release potential is unknown because the integrity of this unit's secondary containment could not be determined in the file material.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past and current release potential is unknown because it is unclear if this unit vented to the atmosphere.

6.29 BUILDING 182

Building 182 is located in the central portion of the facility between Mathilda Avenue and E Street, adjacent to Building 181 (Figure 2).

The current status of the building could not be confirmed without conducting a VSI. Building 182 was handling hazardous waste as of 2004 (ref 104).

6.29.1 SWMU 182-1: Plating Area (1)

See discussion of Plating Areas in Section 6.1.1 (ref 1).

6.29.2 SWMU 182-2: Spray Paint Booths (8)

See discussion of Spray Paint Booths in Section 6.1.2 (ref 1).

6.29.3 SWMU 182-3: Degreasers (5)

See discussion of Degreasers in Section 6.1.3 (ref 1).

6.29.4 SWMU 182-4: Hazardous Waste Tank (WT182-2)

Unit Description

Waste Tank WT182-2 is a 7,400-gallon underground concrete tank used to store hazardous plating shop waste and rinse. There was no information in the file material pertaining to this unit's date of construction and dimensions.

Wastes Managed

The current status of this unit is unknown. This unit would require a RCRA permit. WT182-2 is used to store plating waste and rinse (refs 83, 103). WT182-2 handles wastewater which is typically acidic and contains concentrations of heavy metals such as chromium VI, copper, nickel, lead, iron, and zinc (ref 2). Table 5 presents a complete list of the RCRA codes that apply to the wastes stored in this unit.

Release Controls

There was no information on this unit's release controls in the file material.

History of Release

The capacity of the tank was exceeded as a result of a release from plating process operations during the October 1989 earthquake. Approximately 200 gallons flowed across the pavement into a sump at Building 179 (ref 83).

Remedial Actions

No remedial activities are known to have taken place at this unit.

Soil/Groundwater Release Potential

The past and current release potential is unknown because the integrity of this unit's secondary containment could not be determined in the file material.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past and current release potential is unknown because it is unclear if this unit vented to the atmosphere.

6.29.5 SWMU 182-5: Former Air ScrubbersUnit Description

Air scrubbers formerly located on the roof of the building managed air from the chemical processing shop. The unit was dismantled in 1994 (ref 15). There was no information in the file material pertaining to this unit's date of construction, material of construction and dimensions.

Wastes Managed

There was no information in the file material indicating the types of wastes this unit has managed.

Release Controls

There was no information on this unit's release controls in the file material.

History of Release

There was no information on this unit's release history in the file material.

Remedial Actions

No remedial activities are known to have taken place at this unit.

Soil/Groundwater Release Potential

The past release potential was unknown because the integrity of this unit's secondary containment could not be determined in the file material.

The current release potential is low because the unit is no longer present.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past release potential was unknown because it is unclear if this unit vented to the atmosphere.

The current release potential is low because the unit is no longer present.

6.29.6 SWMU 182-6: Acid Retention SumpUnit Description

This sump was located south of Building 182. It was constructed of concrete and was 6 feet by 3 feet by 6 feet in area, with a capacity of approximately 108 cubic feet (refs 2, 25). There was no information in the file material pertaining to this unit's date of construction and material of construction.

Wastes Managed

The current status of this unit is unknown. This unit would require a RCRA permit. The unit may have managed wastes from the former beryllium shop. The waste streams managed may have included beryllium, chromium, caustics, acids, and solvents (TCE and TCA) (ref 25).

Release Controls

There was no information on this unit's release controls in the file material.

History of Release

There was no information on this unit's release history in the file material.

Remedial Actions

No remedial activities are known to have taken place at this unit.

Soil/Groundwater Release Potential

The past and current release potential is unknown because the integrity of this unit's secondary containment could not be determined in the file material.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past and current release potential is unknown because it is unclear if this unit vented to the atmosphere.

6.29.7 SWMU 182-7: Metal Process Waste Sumps (3)Unit Description

Three sumps are located south of Building 182 (refs 2, 25). There was no information in the file material pertaining to this unit's date of construction, capacity, dimensions, and material of construction.

Wastes Managed

The current status of this unit is unknown. The sumps may have managed wastes from the former beryllium shop. The waste streams managed may have included beryllium, chromium, caustics, acids, and solvents (TCE and TCA) (ref 25).

Release Controls

There was no information on this unit's release controls in the file material.

History of Release

There is no information in the file material regarding the release history from this unit.

Remedial Actions

No remedial activities are known to have taken place at this unit.

Soil/Groundwater Release Potential

The past and current release potential is unknown because the integrity of this unit's secondary containment could not be determined in the file material.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past and current release potential is unknown because it is unclear if this unit vented to the atmosphere.

6.30 BUILDING 183

Building 183 is located in the east portion of the facility, adjacent to Building 181 (Figure 2).

The current status of the building could not be confirmed without conducting a VSI. Building 183 was handling hazardous waste as of 2004 (ref 104).

6.30.1 SWMU 183-1: Degreaser (1)

See discussion of a Degreaser in Section 6.1.3 (ref 1).

6.31 BUILDING 186

Building 186 is located in the east portion of the facility, adjacent to Building 183 (Figure 2).

The current status of the building could not be confirmed without conducting a VSI. Building 186 was handling hazardous waste as of 2004 (ref 104).

6.31.1 AOC 186-1: Leaded Gas UST

A 750-gallon tank was located at the southeast corner of Building 186. It was removed in 1983, and hydrocarbon contamination was suspected. Four soil borings were installed near the location of the tank to a depth of 18 feet, but samples were collected to a depth of only 11 feet bgs. A maximum of 490 ppm TPH was detected, and toluene and xylenes were detected at approximately 10 ppm (ref 25).

In 1988, four soil borings were completed near an active 560-gallon diesel UST and the former location of the 750-gallon gasoline UST. TPH was reported at 490 mg/kg. In 1993, TPH as gasoline was detected in groundwater at 19,400 µg/L, and TPH as diesel was detected at 50 µg/L. A maximum concentration of 2,000,000 µg/L was measured in groundwater at the site on an unknown sampling date. In 1993, the diesel tank was removed (ref 2).

6.32 BUILDING 187

Building 187 is located in the central portion of the facility on 5th Avenue, adjacent to Building 182 (Figure 2).

The current status of the building could not be confirmed without conducting a VSI. Building 187 was handling hazardous waste as of 2004 (ref 104).

6.32.1 SWMU 187-1 Waste Oil Tank

Unit Description

This tank was located at the southeast corner of Building 187. The tank had a 3,000-gallon capacity. The tank was removed in 1987, when hydrocarbon contamination was suspected. Soil and groundwater sampling was conducted near the tank (refs 2, 25).

Wastes Managed

The current status of this unit is unknown. This unit would require a RCRA permit. The tank managed waste coolant oil (ref 25).

Release Controls

There was no information on this unit's release controls in the file material.

History of Release

Samples collected near the unit contained 61 ppb 1,1,1-TCA and 50 ppm volatile hydrocarbons in groundwater, and 96 ppm 1,1,1-TCE in soil (ref 2).

Remedial Actions

The tank was removed in 1987 (ref 2).

Soil/Groundwater Release Potential

The past and current release potential is unknown because the integrity of this unit's secondary containment could not be determined in the file material.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past and current release potential is unknown because it is unclear if this unit vented to the atmosphere.

6.33 BUILDING 188

Building 188 is located in the northeast portion of the facility on the corner of E Street and 5th Avenue, adjacent to Building 182 (Figure 2).

The current status of the building could not be confirmed without conducting a VSI. The file material suggests that Building 188 no longer handled hazardous waste as of 2004 (ref 104). However, Building 188 was handling hazardous waste as of 1997 (ref 105).

6.33.1 SWMU 188-1: Former Spray Booth (1)

See discussion of Spray Booths in Section 6.1.2 (ref 1).

6.34 BUILDING 195B

Building 195B is located in the west central portion of the facility on Mary Avenue, adjacent to Building 195A (Figure 2).

The current status of the building could not be confirmed without conducting a VSI. Building 195B was handling hazardous waste as of 2004 (ref 104).

6.34.1 SWMU 195B-1: Spray Paint Booth (1)

See discussion of Spray Booths in Section 6.1.2 (ref 1).

6.34.2 SWMU 195B-2: Degreaser (1)

See discussion of Degreasers in Section 6.1.3 (ref 1).

6.35 BUILDING 562

Building 562 is located in the eastern portion of the facility on the corner of Mathilda Avenue and 5th Avenue, adjacent to Building 181 (Figure 2).

The current status of the building could not be confirmed without conducting a VSI. Also, the file material suggests that Building 562 no longer handles hazardous waste as of 2004 (ref 104). However, Building 562 was handling hazardous waste as of 1997 (ref 105).

6.35.1 SWMU 562-1: Former Degreaser (1)

See discussion of Degreasers in Section 6.1.3 (ref 1).

6.35.2 SWMU 562-2: Former Wastewater Treatment System

Unit Description

The unit was located on the east side of Building 562. The system included two 3,000-gallon fiberglass lined steel USTs (WT562-1 and WT562-2), four underground sumps, and two ASTs (ref 2).

Wastes Managed

The system managed wastewater, which may have contained ignitable or corrosive wastes and solvents (ref 2).

Release Controls

There was no information on this unit's release controls in the file material.

History of Release

Sampling results for soil near tanks WT562-1 and WT562-2 indicated that no metals were present above regulatory levels. Groundwater sampling in the vicinity of the tanks detected Freon 11 at 5 $\mu\text{g/L}$ (ref 2).

Remedial Actions

The two USTs were removed in May 1989 (ref 2).

Soil/Groundwater Release Potential

The past and current release potential is unknown because the integrity of this unit's secondary containment could not be determined in the file material.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past and current release potential is unknown because it is unclear if this unit vented to the atmosphere.

6.35.3 SWMU 562-3: Former Hazardous Waste Tanks (WT562-1 and WT562-2)

Unit Description

WT562-1 had a capacity of 3,000-gallons and WT562-2 had a capacity of 3,000-gallons. Both WT562-1 and WT562-2 were underground, plastic-lined tanks (ref 104). There was no information in the file material pertaining to the specific locations, date of construction, or dimensions of the units.

Wastes Managed

WT562-1 and WT562-2 were removed in 1989 (ref 2). The tanks were used to manage plating wastes (ref 84). Plating operations include both electroplating and electroless plating with common and precious metals (refs 1, 2). WT562-1 and WT562-2 handled wastewaters from these operations, which were typically acidic and contained concentrations of heavy metals such as chromium VI, copper, nickel, lead, iron, and zinc (ref 2). Table 5 presents a complete list of the RCRA codes that apply to the wastes stored in this unit.

Release Controls

There was no information on this unit's release controls in the file material.

History of Release

Sampling results for soil near tanks WT562-1 and WT562-2 indicated that no metals were present above regulatory levels. Groundwater sampling in the vicinity of the tanks detected Freon 11 at 5 µg/L (ref 2).

Remedial Actions

The two USTs were removed in May 1989 (ref 2).

Soil/Groundwater Release Potential

The past and current release potential is unknown because the integrity of this unit's secondary containment could not be determined in the file material.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past and current release potential is unknown because it is unclear if this unit vented to the atmosphere.

6.36 SURFACE IMPOUNDMENT CLUSTER

The Surface Impoundment Cluster is located in the northern portion of the facility on F Street, adjacent to Building 114 (Figure 2).

The current status of the building could not be confirmed without conducting a VSI.

6.36.1 SWMU Cluster-1: Evaporation PondsUnit Description

Two hazardous waste surface impoundments began operation in 1983 and were closed in 1985. The combined capacity of these impoundments was 1,141,100 gallons per year. Details about the unit are provided below (ref 7):

Wastewater Flow:	1) Process solutions 358,000 gallons per year 2) Cooling Tower Blowdowns 783,000 gallons per year
Average Net Evaporation:	44 inches per year
Pond Area Required:	0.95 acres
Pond Size:	5 feet (depth), 115 feet (width), 185 feet (length)
Pond Surface:	0.98 acres for both ponds
Freeboard:	2 feet
Total Holding Volume:	127,650 cubic feet at 3 feet level
Retention Time:	Approximately 300 days

Wastes Managed

Waste managed in this unit was typically acidic in nature and contained heavy metals. Process waters, including cooling tower blowdown, etching, chemical milling, and plating operations, were held in the ponds, and standing liquid was allowed to

evaporate. The resulting metal hydroxide sludge precipitate was pumped once a year and disposed off site (ref 7).

Release Controls

The impoundments were double lined with 36 mil hypalon liners. Each pond had an interstitial leachate collection system and a lysimeter to detect and collect leakage. Two feet of freeboard were available. According to LMSC, this freeboard was adequate protection against a 100-year storm. The banks of the ponds were one foot above the flood plain (refs 2, 7).

History of Release

The following releases were documented:

- Release beneath both impoundment liners in the west evaporation pond
- Punctured liner in the east pond anchor trenches
- Upper liner seam leak
- Berm spills
- Overflow plumbing leak (ref 1).

Remedial Actions

Samples collected from between the hypalon liner and the clay base contained levels of copper ranging from 375 mg/kg to 1,600 mg/kg, and chromium levels ranging from 115 mg/kg to 140 mg/kg. The leak was subsequently repaired, and contaminated materials were excavated and disposed at an unknown location. The area around the leak was flushed with water to remove any remaining soluble metals, and the pond was restored to service (ref 1).

Soil/Groundwater Release Potential

The past release potential is unknown because the integrity of this unit's secondary containment could not be determined in the file material.

The current release potential is low because the unit no longer is present.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past release potential is unknown because it is unclear if this unit vented to the atmosphere.

The current release potential is low because the unit no longer is present.

6.36.2 SWMU Cluster-2: Holding PondsUnit Description

Two surface impoundments are located on the north end of the LMSC facility (Figure 11). They have been in operation since 1983 and are classified as Class II impoundments. The capacity of the combined units is 950,000 gallons (refs 1, 2).

Wastes Managed

Rinsewaters and quenching waters from electroplating are managed in this unit (refs 1, 2).

Release Controls

These ponds are single lined with hypalon (ref 2).

History of Release

File material did not indicate whether releases have occurred.

Remedial Actions

No remedial activities are known to have taken place at this unit.

Soil/Groundwater Release Potential

The past and current release potential is low due to the presence of secondary containment.

Surface Water Release Potential

Insufficient information was found in the file material to determine the release potential to surface water from this unit.

Air Release Potential

The past and current release potential is unknown because it is unclear if the unit vented to the atmosphere.

6.37 STORM DITCH 001

6.37.1 AOC 001-1: Storm Ditch 001

In June of 1990, approximately 2,000 gallons of chilled solution containing 200 ppm nitrate and an unknown concentration of diethylaminoethanol were released when a chilled water line was ruptured (Figure 10). The water entered Drainage Ditch 001, which empties into a wetland area. Drainage Ditch 001 was diked with dirt to contain the release. Several hundred gallons of solution pooled in a flatland area. Material released was pumped from the ditch and pooled area. No characterization data of the waste were located during the file review; however, soil samples were collected from the standing liquid at the pipe break, the drainage ditch, the flatland past the berm, and the wetlands bird pond (ref 76).

6.38 WASTE TRANSFER LINES

6.38.1 AOC WTL: Waste Transfer Lines

Minimal information was found regarding the use, location (aboveground, underground), and materials (PVC, metal, hosing) of the waste transfer lines at LMSC. However, the small amount of available information strongly suggests that waste transfer lines have been or are present at LMSC. Booz Allen located file information at the City of Sunnyvale pertaining to a waste transfer line being punctured on September 28, 1988, four feet below ground surface, releasing hazardous constituents between Buildings 159C and 171. This document suggests that LMSC possesses blue prints denoting the waste transfer lines located at the facility. Furthermore, Booz Allen discovered other documents indicating that waste transfer lines were potentially the source of hazardous constituents being released to the environment. Due to the lack of information in the file material regarding waste transfer lines, the overall environmental impact of former releases from waste transfer lines cannot be determined.

7.0 EXPOSURE PATHWAYS AND HUMAN AND ENVIRONMENTAL RECEPTORS

7.1 Surface Water

The LMSC facility is located south of San Francisco Bay and Guadalupe Slough. Wetlands are located within the facility boundary, and along the western property line. Limited information on the proximity of surface waters, other than the Bay and Slough, is present in the file material. Insufficient information was found in the file material to determine exposure pathways and receptors for surface water.

7.2 Groundwater

Groundwater beneath the facility is contaminated from site industrial activities. Groundwater is impacted by VOCs and metals to a depth of 55 feet bgs. A groundwater extraction system has been operational at the facility since 1992. Limited information on the effectiveness of the groundwater extraction system is present in the file material.

7.3 Air

Limited information on air releases or permits obtained by the facility is present in the available file material. Many of the degreasers and spray booths have discharges to the atmosphere.

7.4 Surface Soil

Surface soil at the site is contaminated from industrial activities conducted at the facility. Sampling activities have detected significant contamination at several locations with subsequent soil excavation performed. File material did not address whether all areas of soil contamination have been identified, sampled, and remediated. The facility is fenced; therefore, only industrial worker scenarios are probable for soil exposure pathways.

8.0 VISUAL SITE INSPECTION

8.1 Purpose of the Visual Site Inspection

A VSI is typically conducted after the initial information gathering step of the RFA process is complete. The purpose of the VSI is to obtain information that was not completely disclosed in the file review by visiting the facility. During the VSI, the focus is to identify SWMUs and collect visual evidence of releases at the facility. The information gathered during the VSI is evaluated along with the information gathered during the Preliminary Review step to determine the probability that a release has occurred at the facility.

8.2 Summary of the Visual Site Inspection

After completion of the Preliminary Review, EPA Region 9, along with the California RWQCB (Region 2) and the DTSC, determined that a VSI would not be required for this facility. Further investigation will be pursued under the authority of the RWQCB.

9.0 SUGGESTIONS FOR FURTHER ACTION

Because a VSI was not conducted at this facility, unit-specific suggestions for further action are not included. General areas of concern include the current and former vapor degreasers, plating areas, and waste transfer lines. Per discussions with EPA Region 9, RWQCB Region 2 plans oversee the collection of additional information on the 40 vapor degreasers and waste transfer lines.

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 24. Soil Excavation and Sampling East of Building 170. Prepared by McLaren Environmental Engineering. November 1988.
 25. Investigation of Contaminant Sources and Assessment of Remedial Measures for Soils and Groundwater at Buildings 181/182/186/187. Prepared by McLaren Environmental Engineering. August 11, 1988.
 26. Remedial Effectiveness Evaluation and Semi-Annual Groundwater Monitoring

- Report for February 2001 through July 2001. Prepared by Cameron-Cole.
October 2001.
27. Letter from H. K. Willard, to Dwight Hoenig, Lockheed. Re: LMSC. October 20, 1986.
 28. Soil Pollution Source Identification Results and Soil Pollution Characterization Work Plan. Prepared by McLaren Environmental Engineering. January 1989.
 29. Soil Pollution Characterization Report. Prepared by McLaren. February 2, 1990.
 30. Phase III Groundwater Characterization. Prepared by McLaren. April 1990.
 31. Phase II Groundwater Characterization. Prepared by McLaren. April 1989.
 32. Soil Excavation and Sampling at Building 187. Prepared by McLaren. April 1989.
 33. Letter from Gary M. Carlton, McLaren, to Cynthia Corbett, Lockheed, re: Additional Soil and Groundwater Sampling at Storm Ditch 002. August 21, 1990.
 34. Letter from E.A. Thompson, Lockheed, to Jeff Zelikson, EPA, re: Information Regarding Potential Releases from SWMUs. 1987.
 35. Letter from Alex Naugle, RWQCB, to Allen Lund, Lockheed, re: Transmittal of Order No. 00-124, Updated Site Cleanup Requirements and Rescission of Order No. 88-013. December 6, 2000.
 36. Letter from Mark C. Posson, Lockheed, to Alec Naugle, California RWQCB, re: Divestiture of Lockheed Martin Corporation, Missiles and Space Property, Sunnyvale, CA. February 21, 2001.
 37. Letter from A.L. Hubbard, Lockheed, to EPA, re: Attached Part A Hazardous Waste Permit Application. November 19, 1980.
 38. Letter from Howard K. Hatayama, DHS Toxic Substances Control Program, to M.C. Posson, Lockheed, re: Application for Variance from the Hazardous Waste Facility Permit Requirements (Buildings 114 and 71). June 19, 1990.
 39. Hazardous Materials Discharge Notification. Prepared by R. Staricha, Department of Public Safety, re: well water analysis, listing Lockheed as probable cause of discharge. September 7, 1989.

40. Letter from W.C. Kossack, Lockheed, to H. Seraydarian, DHS Hazardous Materials Management Section, re: Hazardous Waste Permit Application/waste incinerators. October 30, 1981.
41. Letter from W.C. Kossack, Lockheed, to Debbie Robinson, EPA, re: Revised Hazardous Waste Permit Application (EPA Form 3510-3). July 28, 1983.
42. Letter from H. Seraydarian, DHS Toxics and Waste Management Division to W.C. Kossack, Lockheed, re: Hazardous Waste Permit Application/waste incinerators. September 28, 1984.
43. Letter from Dwight R. Hoenig, to Jack Freeman, Lockheed, re: Notice of Violation (CAD009125535). January 14, 1986.
44. Letter from H. Seraydarian, DHS Toxics and Waste Management Division, to Richard P. Wilcoxon, DHS Toxic Substances Control Division, re: Notice-- Lockheed in violation of State regulations governing generators of hazardous waste. February 29, 1994.
45. Letter from Roger B. James, California Regional Water Control Board, W.C. Kossack, Lockheed, re: Attached annual groundwater monitoring program evaluation. June 27, 1985.
46. Letter from Roger B. James, California Regional Water Control Board, to W.C. Kossack, Lockheed, re: Proposal to test and begin use of west evaporation pond. September 11, 1985.
47. Letter from H. Kirk Willard, Lockheed, to Kimberly J. Hall, Ecology and Environment, Inc., re: Supplemental information requested for preliminary assessment. December 7, 1990.
48. Letter from H.K. Willard, Lockheed, to Michael T. Feeley, EPA, re: December 13, 1985 letter from EPA. December 17, 1985.
49. Quarterly Monitoring Report. Prepared by McLaren/Hart, Inc., for Lockheed, re: Monitoring of Plant 1 Site. June 22, 2000.
50. Letter from A.R. Stankunas, Lockheed, to Louis Goldsmith, RWQCB, re: Drain Line Closure Without Soil Sampling. July 2, 1993.

51. Letter from A.R. Stankunas, Lockheed, to Bruce Wolf, Lockheed, re: Drain Line Closure in Building 182. July 8, 1993.
52. Letter Dwight Hoenig, DHS Toxic Substances Control Division, Lockheed, to H.K. Willard, Lockheed, re: Denial of variance permit. May 28, 1986.
53. Hazardous Materials Discharge Notification, prepared by R. Staricha, Department of Public Safety, re: Well water detection of oil and grease leak. September 26, 1989.
54. Hazardous Materials Discharge Notification. Prepared by R. Staricha, Department of Public Safety, re: Earthquake and discharge of 200 gallons of Chromic acid from plating tank. October 19, 1989.
55. Hazardous Materials Discharge Notification. Prepared by R. Staricha, Department of Public Safety, re: Possible release from underground tank. October 20, 1989.
56. Hazardous Materials Discharge Notification. Prepared by R. Staricha, Department of Public Safety, re: Leaks into storm drains. October 23, 1989.
57. Letter from Roger B. James, California Regional Water Control Board, to W.C. Kossack, Lockheed, re: Proposal to test and begin use of west evaporation pond. September 20, 1985.
58. Compliance Evaluation Inspection, Lockheed Missiles and Space Company, Inc. For fiscal years 1985-1986.
59. EPA Hazardous Waste Permit Application, contact: W.C. Kossack, Lockheed, re: Description of hazardous waste materials. December 21, 1984.
60. Hazardous Materials Discharge Notification. Prepared by R. Staricha, Department of Public Safety, re: Severed cooling line, discharge of 2,000 gallons to drainage ditch. June 12, 1990.
61. EPA Inspection Report and Verification Call Sheet, prepared by Tamara Jo Brode, Field Inspections Section, EPA, for Lockheed. September 9, 1982.
62. Letter from Allen J. Fund, Lockheed, for John Robertson, California RWQCB, re: Notification of Unauthorized Release of Coolant from Building 170 Sump. November 14, 1997.

63. Operating Plan for the Central Wastewater Treatment Plant prepared by Hazardous Waste Management Branch, California State DHS. Form I.A.1.b. March, 1985.
64. Letter from M.C. Posson, Lockheed, for Louis Goldsmith, California RWQCB, re: Request for Reactivation of East Holding Pond, Building 175. May 26, 1992.
65. Letter from Howard K. Hatayama, DHS Toxic Substances Control Program, for Joel C. Suty, Lockheed, re: Closure for hazardous waste line. June 6, 1991.
66. Hazardous Materials Discharge Notification. Prepared by R. Staricha, Department of Public Safety, re: Earthquake and discharge of 200 gallons of Chromic acid from plating tank. October 19, 1989.
67. Letter from Marty Laporte, Lockheed, for Daniel Getreu, Bureau of Fire Prevention, re: Final Report on Soil Sampling and Removal of Contaminated Soil. February 25, 1992.
68. Letter from James Scott Bullock and Charlene F. Williams, DHS Toxic Substances Control Program, re: Report of Violation. April 20, 1990.
69. Letter from M.C. Posson, Lockheed, for Ron Staricha, Department of Public Safety, re: Results of Building 151 Subfloor Core Samples. May 22, 1989.
70. Letter from Miguel A. Ortega, Ecova, for Louis Goldsmith, California Regional Water Quality Control Board, re: Contaminated soil at facility. July 27, 1989.
71. Letter from Harry Seraydarian, EPA, for Lockheed, re: Loss of interim status for all affected land disposal units. October 19, 1989.
72. Letter from Mark C. Posson, Lockheed, for Ron Staricha, Department of Public Safety, re: Report on July 5, 1990 Incident (case number 11687). July 19, 1990.
73. Letter from Mark C. Posson, Lockheed, for Loretta Barsamian, California RWQCB, re: Lockheed divestiture. September 2, 1999.
74. Letter from Mark C. Posson, Lockheed, for Alec Naugle, California RWQCB, re: Lockheed divestiture. February 21, 2000.
75. Letter from Luz T. Castillo and Charlene F. Williams, DHS Toxic Substances

- Control Division, re: Report of Violations and Schedule for Compliance. May 6, 1988.
76. Letter from H.K. Willard, Lockheed, for Ron Staricha, Fire Prevention Bureau, re: Material Release Into the Environment. June 25, 1990.
77. Site Cleanup Requirements for Lockheed. Prepared by Roger B. James, California RWQCB. January 20, 1988.
78. Letter from Sonia S. Low, DHS Toxic Substances Control Division, for H. Kirk Willard, Lockheed, re: Variance Request (enclosures). June 13, 1986.
79. Letter from Tim Costello, McLaren Environmental Engineering, for Louis Goldsmith, California Regional Water Control Board, re: Lockheed Sunnyvale Contaminant Source Identification Report. January 31, 1989.
80. Letter from Lynne Anderson, Lockheed, for Sonia S. Low, DHS Toxic Substances Control Division, re: Surface Impoundment Post Cleanup Sampling Results and Analysis. June 29, 1987.
81. Letter from Lynne Anderson, Lockheed, for Sonia S. Low, DHS Toxic Substances Control Division, re: Surface Impoundment Post Cleanup Sampling Results and Analysis. November 19, 1992.
82. Letter from M.O. Ghassemi, Lockheed, for Louis Goldsmith, California Regional Water Control Board, re: Water Quality Monitoring Program Report. November 19, 1992.
83. Letter from M. Posson, Lockheed, to R. Staricha, Re: Notification of Incidents Resulting From Earthquake. November 1, 1989.
84. Letter from M. Posson, Lockheed, to L. Castillo, DHS, Re: Inadvertent Release from Waste Tank 013-2. August 3, 1988.
85. Letter from M. Posson, Lockheed, to R. Wheeler, Re: November 23 and December 2, 1988. Incident Report. December 8, 1988.
86. Letter from M. Posson, Lockheed, to R. Staricha, Re: Incident of January 3, 1990. January 18, 1990.
87. Letter from M. Posson, Lockheed, to R. Staricha, Re: Follow-up on Inadvertent

- Release fro Waste Tank 013-2. April 27, 1990.
88. Addendum to Post-Closure Report, Building 104. Prepared by McLaren/Hart, Inc. April 7, 2000.
 89. Remedial Measures Workplan for Impacted Soils at the Former Building 104 facility, Lockheed Martin Corporation, Missiles and Space, Sunnyvale, California. March 17, 2000.
 90. Letter from H. Willard, Lockheed, to R. Staricha, City of Sunnyvale, Re: Lab analyses from Block 7, Building 151. April 10, 1990.
 91. People of the State of California v. Lockheed Missiles & Space Co., Inc. Superior Court of the State of California for the County of San Francisco, re: Complaint for Civil Penalties. October 24, 1986.
 92. Inspection Report for Lockheed Missiles & Space Co. Prepared by State of California DHS. April 5, 1990.
 93. Website: <http://www.weatherbase.com/weather>. Temperature and precipitation information for Sunnyvale and Mountain View, CA. No Date.
 94. Letter from M. Posson, Lockheed, to L. Goldsmith, re: Notification of Oil Contamination at Building 152. March 2, 1989.
 95. Well Abandonment Report for the LMSC Plant One Facility. January 9, 1998.
 96. Monthly Monitoring Data for March 2000, Lockheed Martin Space Systems Company Plant One Site, Sunnyvale, California. April 19, 2000.
 97. City of Mountain View website: <http://www.ci.mtnview.ca.us/citydepts>.
 98. Inspection Report for Lockheed Missiles & Space Co. Prepared by State of California DHS. September 20, 1991.
 99. Inspection Report for Lockheed Missiles & Space Co. Prepared by State of California DHS. June 10, 1994.
 100. Inspection Report for Lockheed Missiles & Space Co. Prepared by State of California DHS. September 7, 1995.

101. Letter from Allen Lund, LMSC, to Stewart McGee, City of Sunnyvale, re: Aboveground Post-Closure Report Building 041. March 7, 2002.
102. Notice of Inspection by City of Sunnyvale, LMSC Building 041. March 7, 2002.
103. Hazardous Waste Inspection Report. Prepared by DHS. Date of Inspection March 3, 1987. June 24, 1987.
104. LMSC Business and Hazardous Materials Management Plan. 2004.
105. LMSC Business Plan Hazardous Materials Management Plan. 1997.
106. Tiered Permit Applications. Prepared by LMSC. March 25, 1993.
107. Hazardous Material Discharge Notification. Prepared by Ron Staricha, City of Sunnyvale. July 14, 1994.
108. Hazardous Material Discharge Notification. Prepared by Ron Staricha, City of Sunnyvale. August 10, 1989.
109. Hazardous Material Discharge Notification. Prepared by Ron Staricha, City of Sunnyvale. February 26, 1987.
110. Hazardous Material Discharge Notification. Prepared by Ron Staricha, City of Sunnyvale. August 11, 1987.
111. Hazardous Material Discharge Notification. Prepared by Ron Staricha, City of Sunnyvale. May 25, 1989.
112. Hazardous Material Discharge Notification. Prepared by Ron Staricha, City of Sunnyvale. October 20, 1989.
113. Hazardous Material Discharge Notification. Prepared by Ron Staricha, City of Sunnyvale. September 30, 1987.
114. Underground Facilities Closure Plan/Permit. City of Sunnyvale. October 14, 1988.
115. Hazardous Material Discharge Notification. Prepared by J. Prasad, City of Sunnyvale. February 18, 1987.

116. Site Closure Plan. Prepared by LMSC. No Date
117. Letter from L.N. Erickson, LMSC, to Anne Draper, City of Sunnyvale, re: Material Handling Data, LMSC Building 114. No Date.
118. Letter from Allen Lund, LMSC to Stewart McGee, City of Sunnyvale, re: Aboveground Closure Notification of Concrete Pad at LMSC Building 140. February 12, 2001.
119. Letter from H.K. Willard, LMSC, to Ben Gikis, City of Sunnyvale, re: Building 150 Chemical Use Area Closure. March 3, 1993.
120. Aboveground Facilities Closure Notification. City of Sunnyvale. November 20, 1987.
121. Post-Closure Report of LMSC Building 170. Prepared McLaren Hart. February 3, 1999.

APPENDICES

APPENDIX A

FIGURES

FIGURE 1

LOCKHEED SITE LOCATION MAP

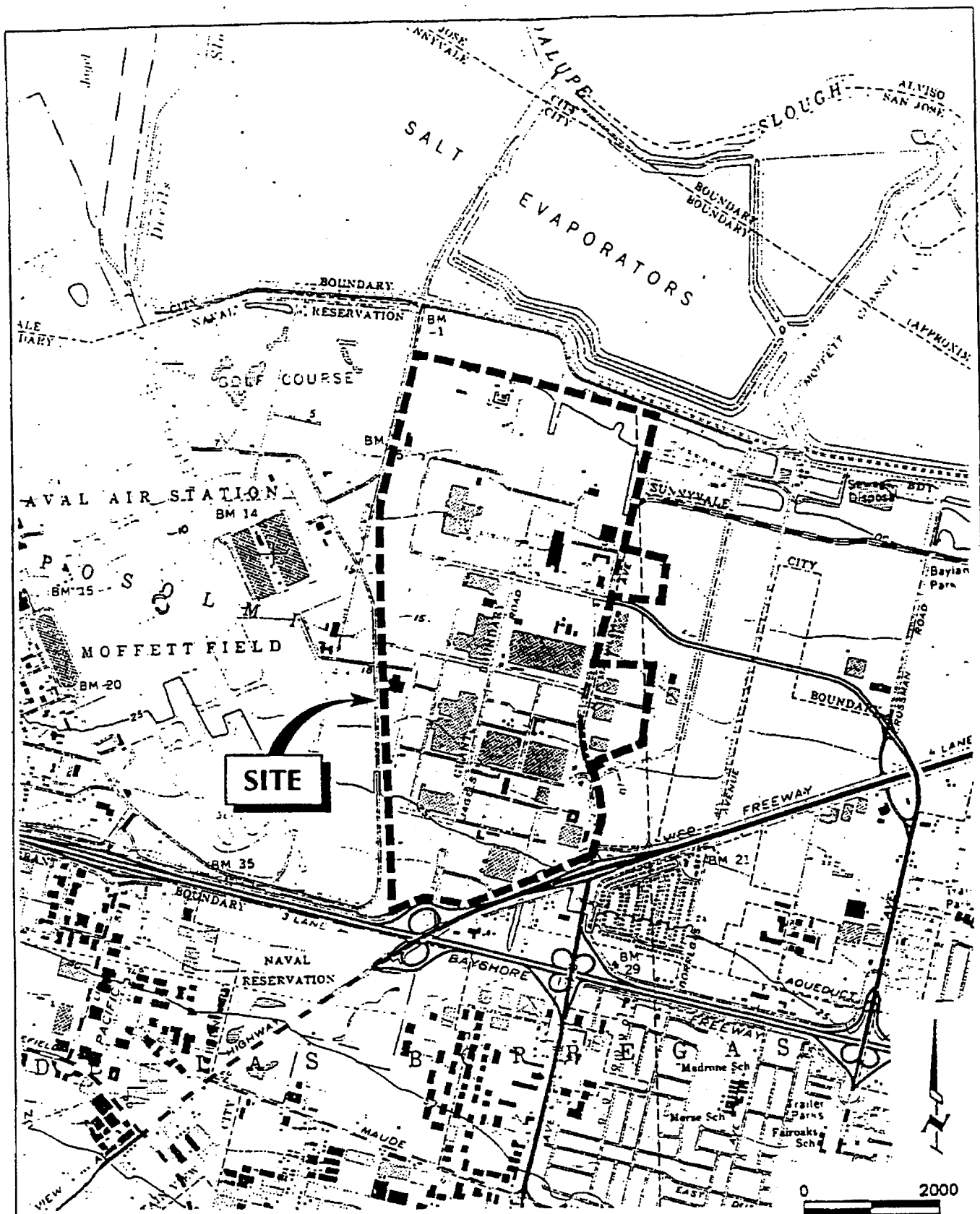
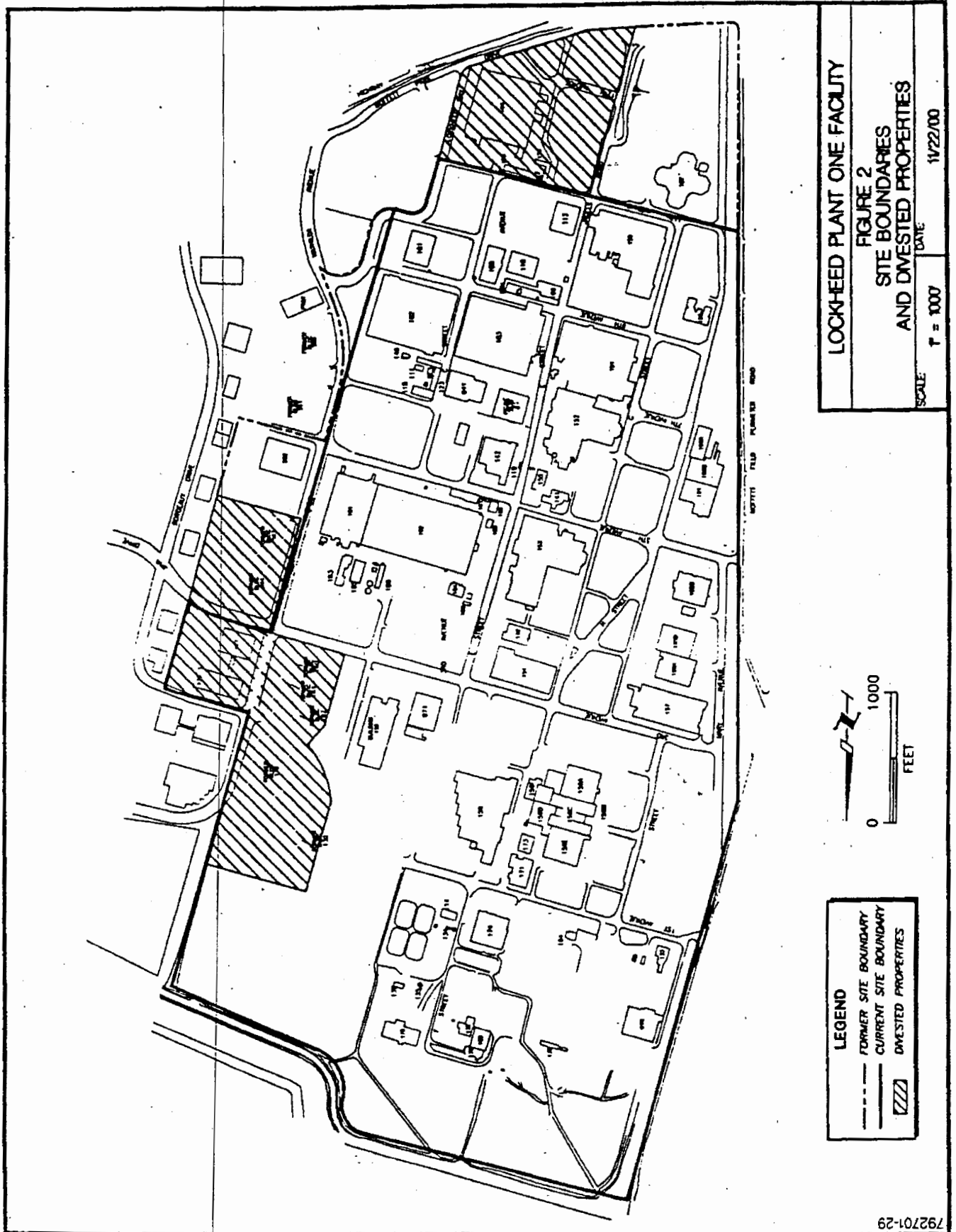


FIGURE 2

LOCKHEED YEAR 2000 SITE MAP

Table 1 Identified Properties



LOCKHEED PLANT ONE FACILITY

FIGURE 2
SITE BOUNDARIES
AND DVESTED PROPERTIES

SCALE: 1" = 1000' DATE: 11/22/00



LEGEND	
---	FORMER SITE BOUNDARY
---	CURRENT SITE BOUNDARY
///	DVESTED PROPERTIES

FIGURE 3

LOCKHEED YEAR 1981 SITE MAP

Figure 3

3

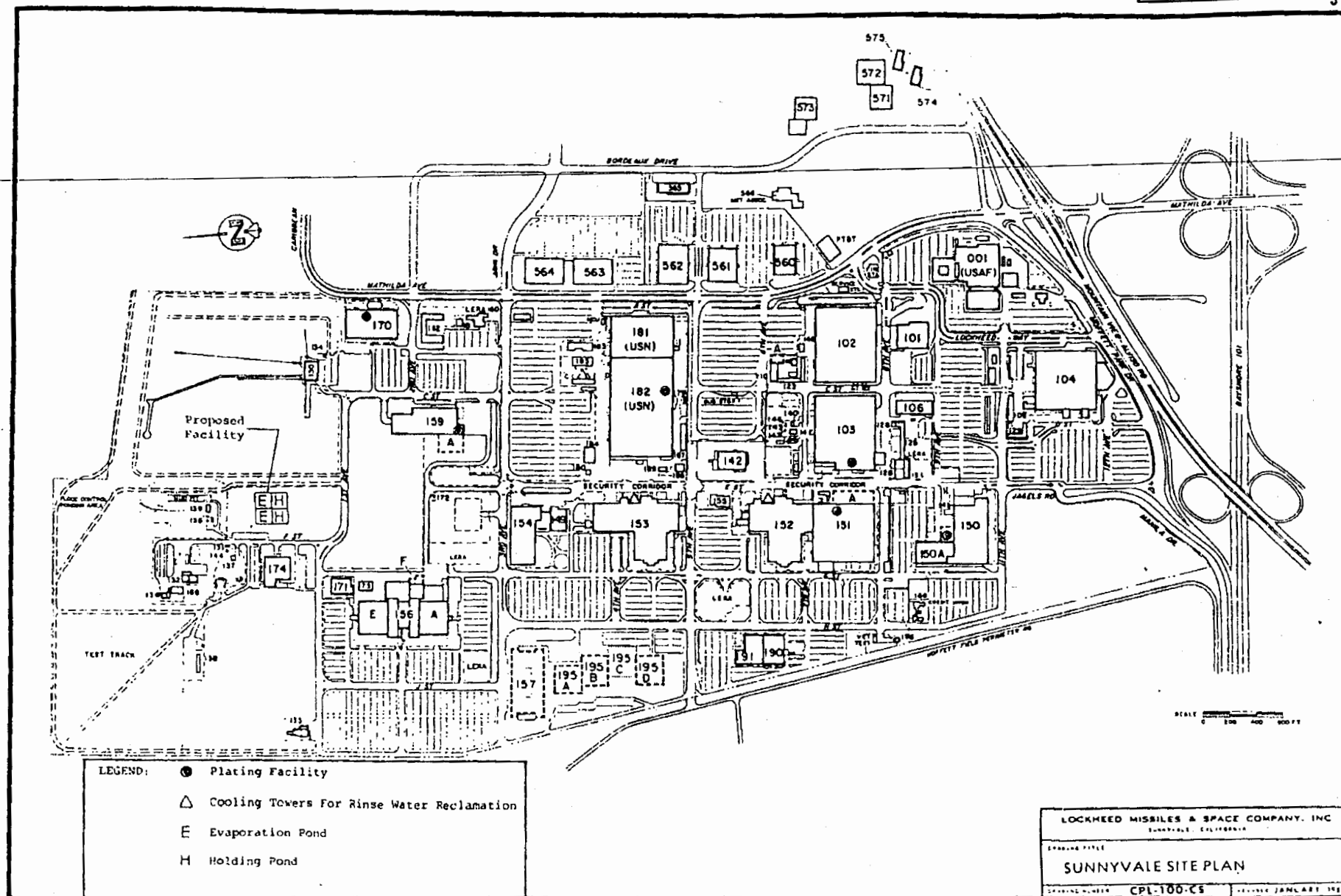
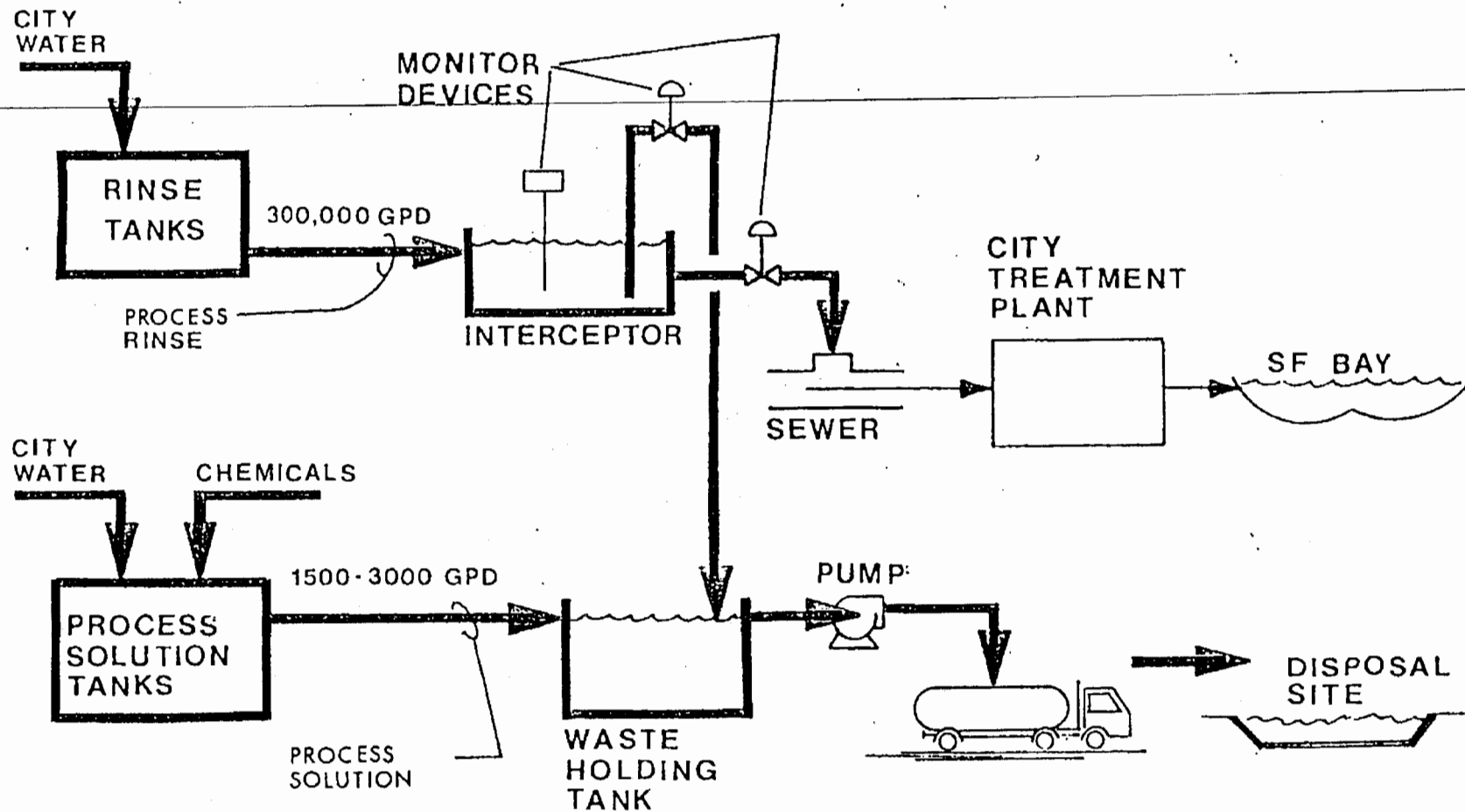


FIGURE 4

**WASTEWATER HANDLING AND DISPOSAL DIAGRAM,
1981**

FIGURE 4 PRESENT METHOD OF PROCESS WASTEWATER DISPOSAL



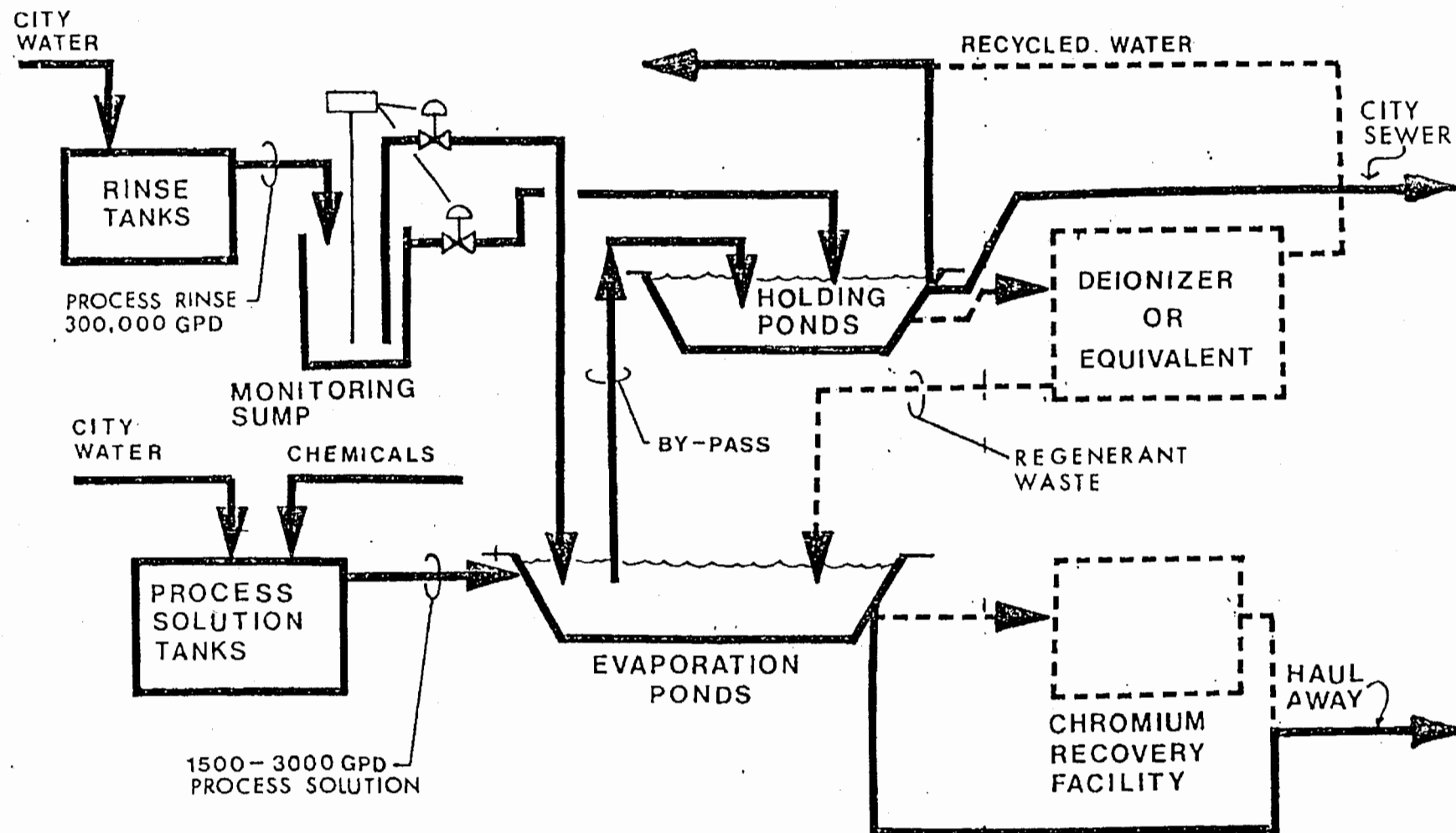
LMSC
PLANT
ENGINEERING

FIGURE 5

**PROPOSED FUTURE WASTEWATER HANDLING AND
DISPOSAL DIAGRAM, 1981**

Figure 5

PROPOSED METHOD OF PROCESS WASTEWATER DISPOSAL



— IMPLEMENTED IN '81

- - - IMPLEMENTED IF REQUIRED
OR ECONOMICAL

LMSC
PLANT
ENGINEERING

FIGURE 6

**PRESENT AND PAST UST LOCATIONS AT LOCKHEED,
1999**

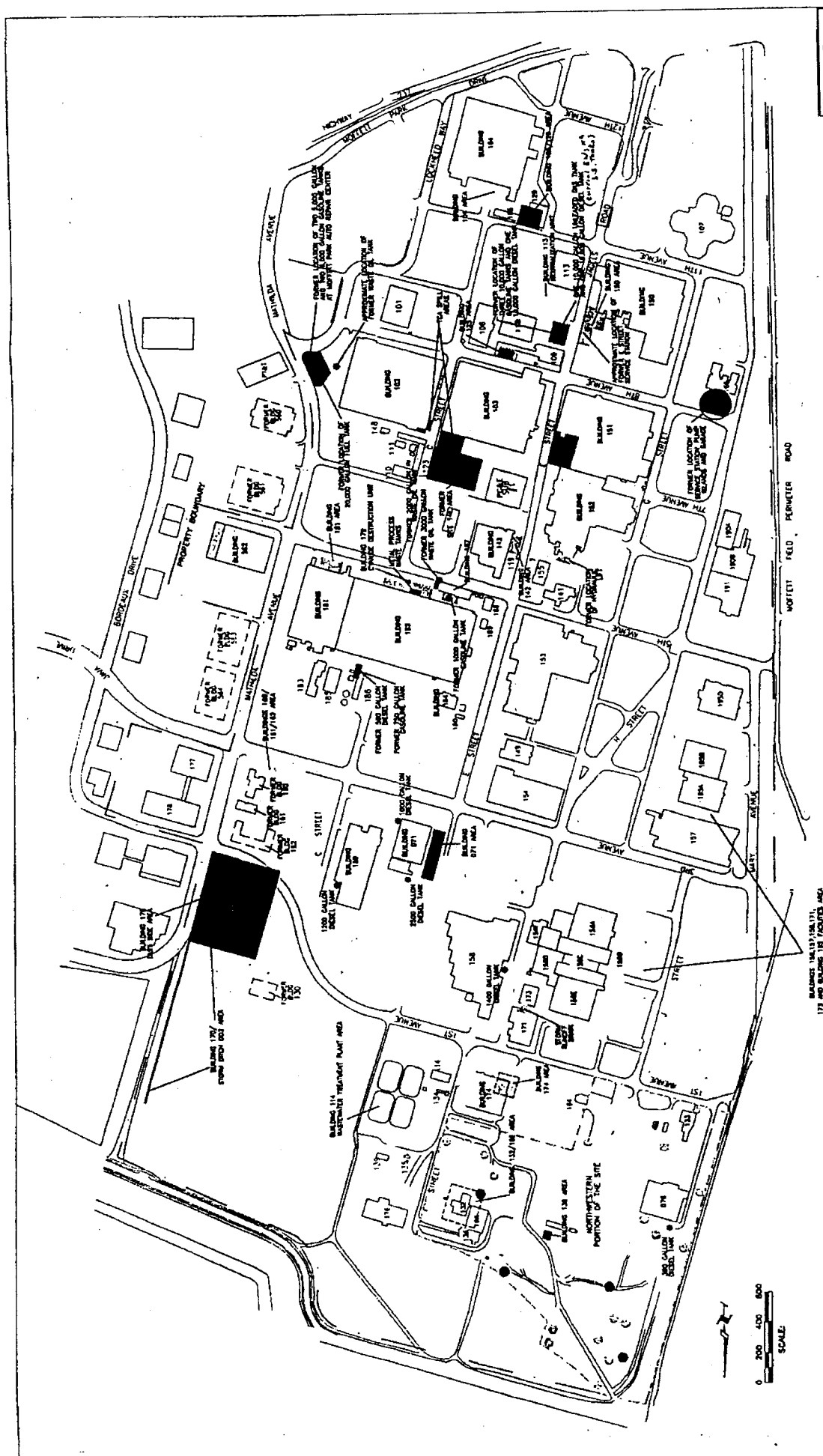


Figure 6
 LOCATION OF POTENTIAL
 SOURCE AREAS
 LUMAS PLANT ONE SITE

LEGEND

- KNOWN SOIL CONTAMINATION (LIKELY SOURCE OF GROUNDWATER CONTAMINATION)
- KNOWN SOIL CONTAMINATION (UNLIKELY SOURCE OF GROUNDWATER CONTAMINATION)
- NEGLIGIBLE SOIL CONTAMINATION DETECTED

PROCESS AREAS WHERE SOIL SAMPLING HAS OCCURRED ONLY IN CONNECTION WITH CLOSURE ACTIVITIES

FIGURE 7

**LMSC SWMU AND AOC MAP
MAY 2005**

FIGURE: 7
LMSC SWMU AND AOC MAP
MAY 2005

* The exact location of the waste transfer lines (AOC WTL) could not be determined.

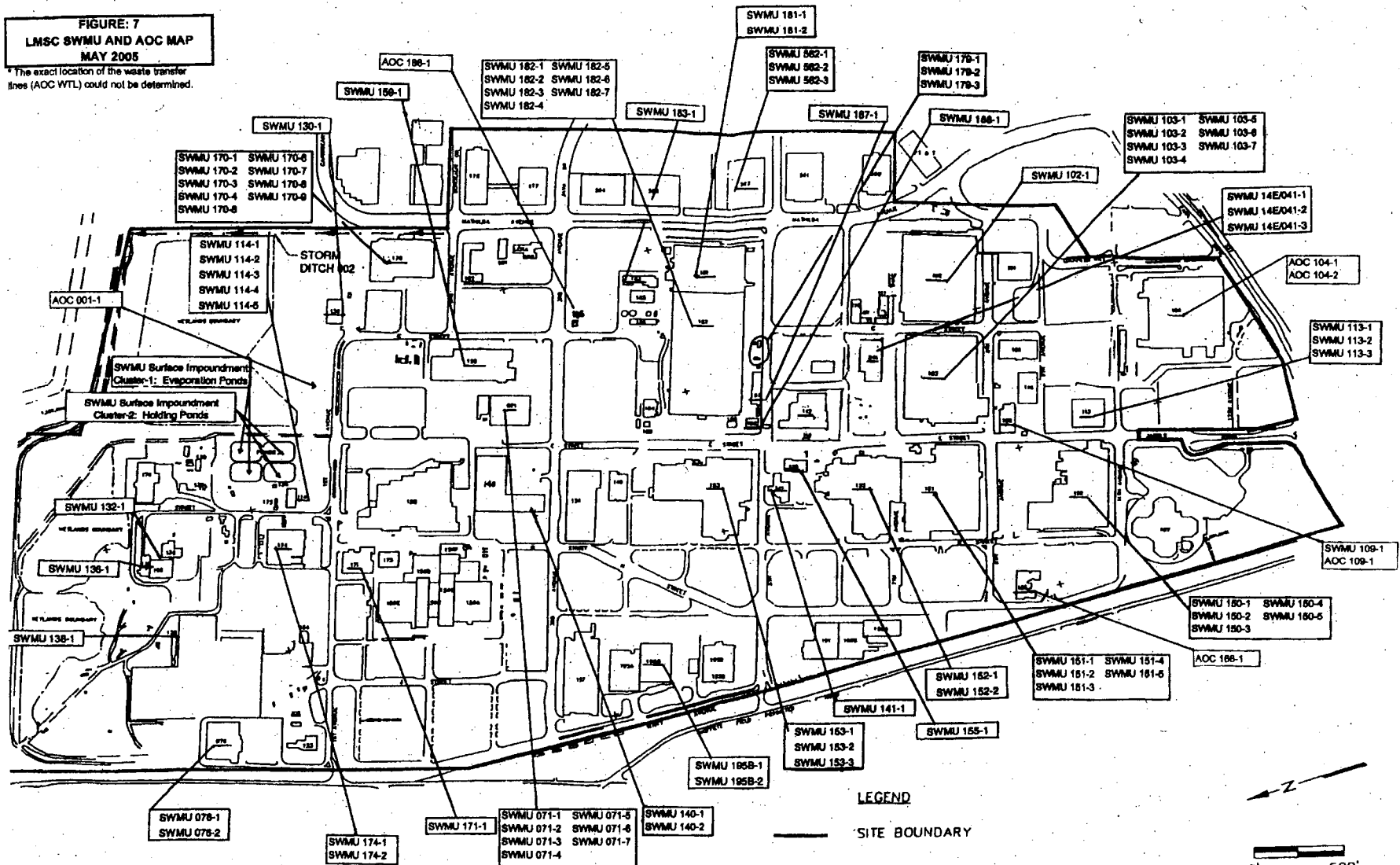
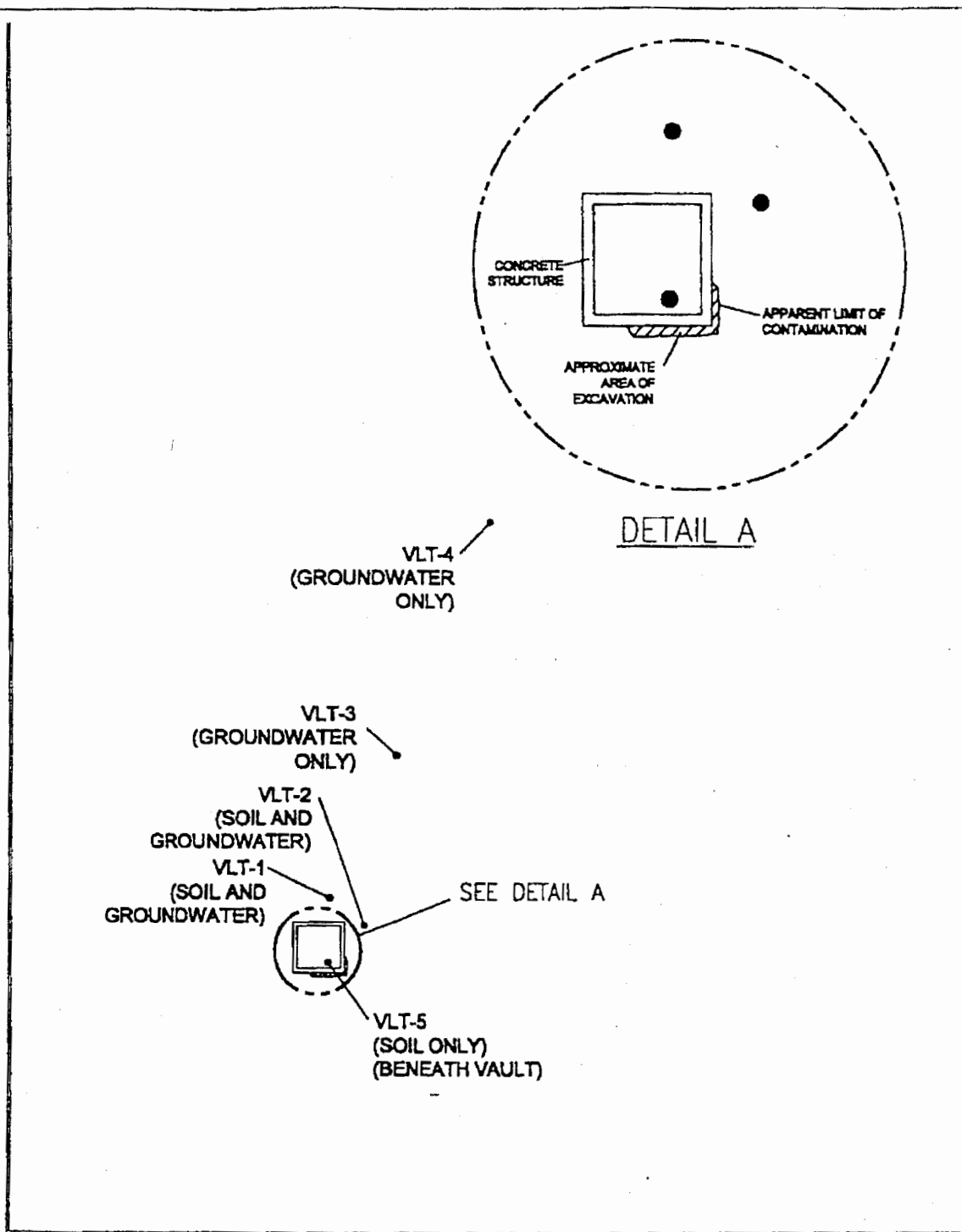


FIGURE 8

BUILDING 104 AOC DETAIL



VLT-4
(GROUNDWATER ONLY)

VLT-3
(GROUNDWATER ONLY)

VLT-2
(SOIL AND GROUNDWATER)

VLT-1
(SOIL AND GROUNDWATER)

SEE DETAIL A

VLT-5
(SOIL ONLY)
(BENEATH VAULT)

FORMER LMMS
BUILDING 104

LEGEND:

VLT-1 ● APPROXIMATE LOCATION OF SOIL BORING

NOT TO SCALE

FIGURE 9

BUILDING 151 LAYOUT AND SAMPLE LOCATIONS

Figure 9

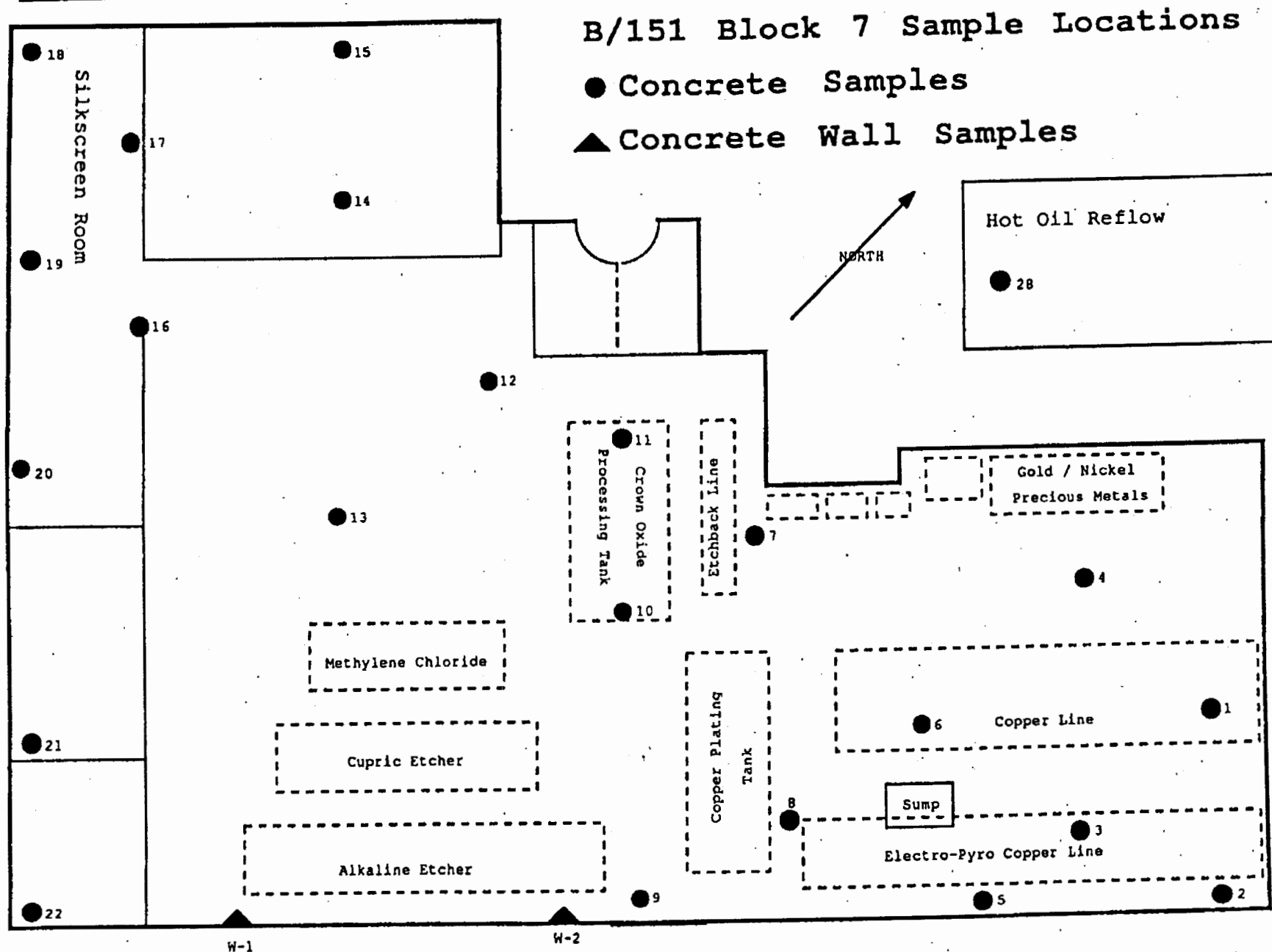
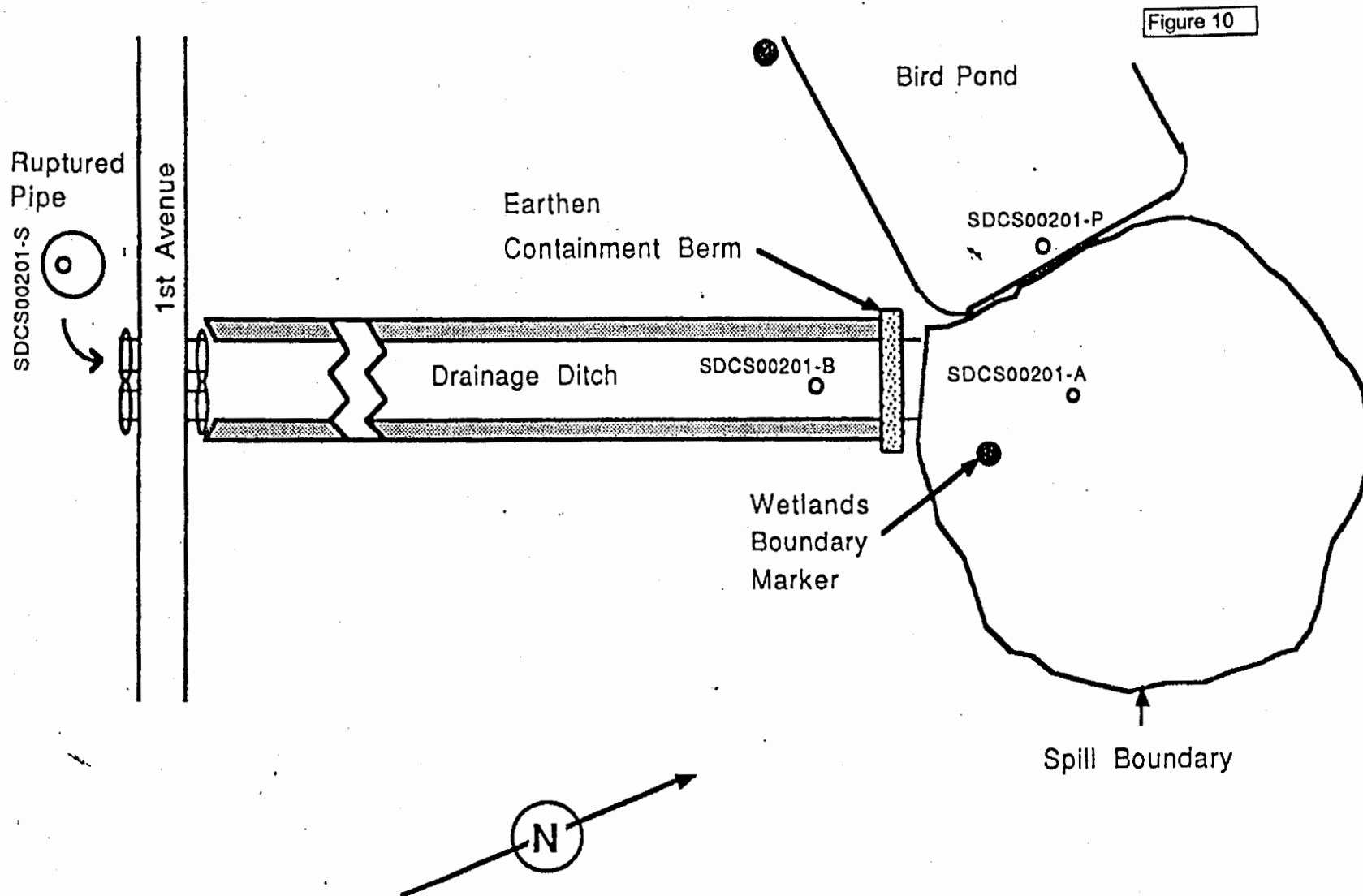


Figure Not to Scale

FIGURE 10

BUILDING 159 SPILL REPORT DIAGRAM

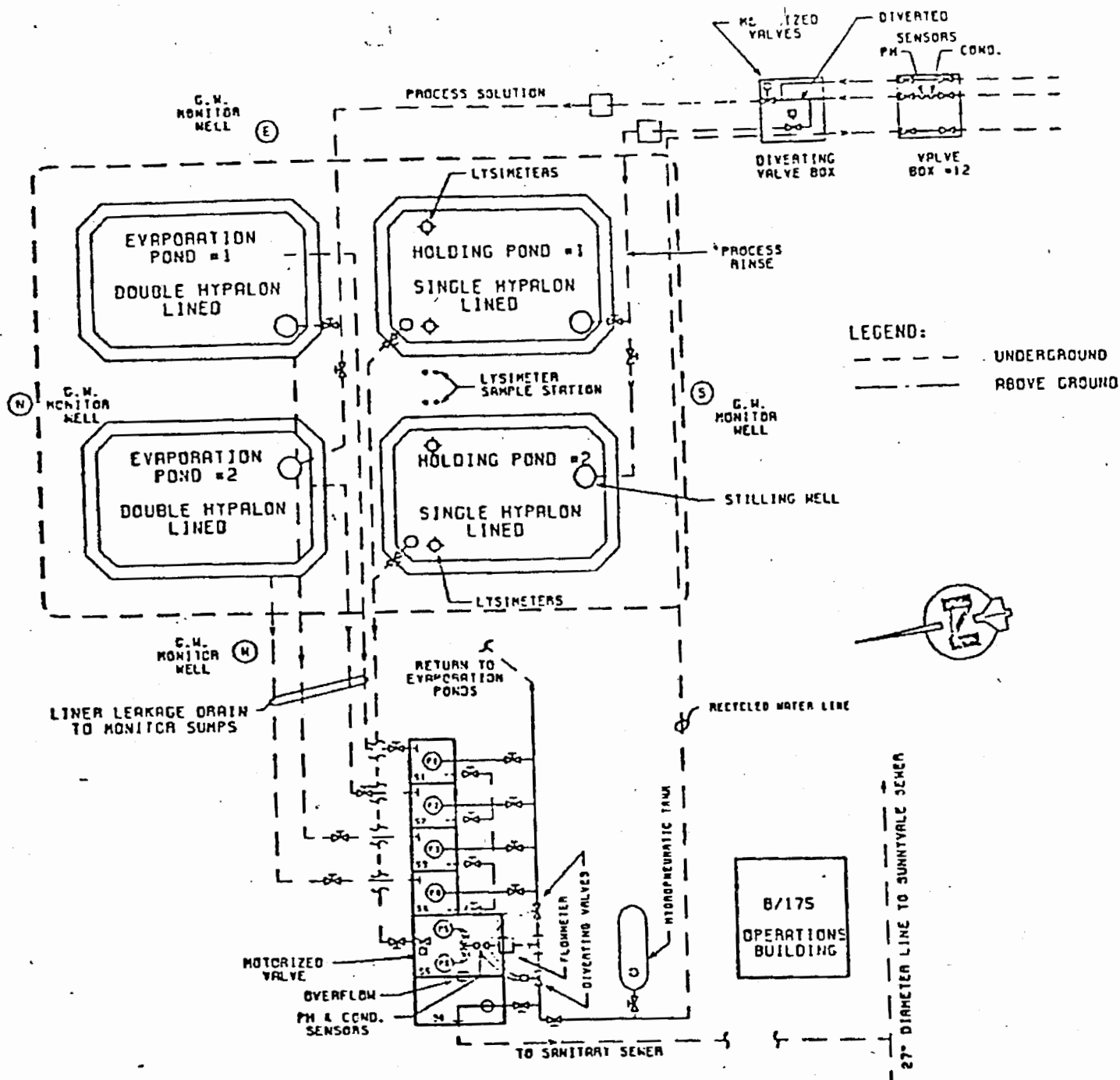


Building 159 Chilled Water Release Area

Drawing is not to scale
○ Sample Locations

FIGURE 11

SURFACE IMPOUNDMENT CLUSTER LAYOUT



1. S1 & S2 COLLECT LEAKAGE FROM UPPER LINER OF PONDS E1 & E2.
2. S3 & S4 COLLECT LEAKAGE FROM LOWER LINER OF PONDS E1 & E2.
3. S5 MOTORIZED VALVE IS FLOAT OPERATED ON GRAVITY FLOW LINE TO MAINTAIN LEVEL IN SUMP 5.
4. MOTORIZED VALVES ON DIVERTING VALVE BOX AND TRANSFER PUMP DISCHARGE AT S5 ARE PH & CONDUCTIVITY CONTROLLED. PH & CONDUCTIVITY ARE RECORDED.
5. PUMPS ON S1-S4 ARE FLOAT CONTROLLED AND MONITORED ON EVENT RECORDER.

Figure 11

LOCKHEED MISSILES & SPACE COMPANY, INC.				ORGN. 45-52	DATE
A SUBSIDIARY OF LOCKHEED AIRCRAFT CORPORATION				DRAWN M.A. MCGATH	4/5/52
SUNNYVALE, CALIFORNIA				CHECKED M.J. LAVELLE	4/5/52
TITLE: SIMPLIFIED SCHEMATIC DIAGRAM OF B/175 PROCESS WASTEWATER				APPROVED M.J. LAVELLE	4/15/52
HOLDING & EVAPORATION POND DISTRIBUTION & CONTROL SYSTEM				APPROVED	
LOCATION LOCKHEED BUILDING 175				E	A
ACTIVITY 1	ORGN. 45-52	SCALE NONE	SHT. 7 OF 7		

APPENDIX B

INFORMATION NEEDS LIST

INFORMATION NEEDS LIST

The following information needs were identified during a review of the file material. This information will be requested from the facility prior to the Visual Site Inspection (VSI):

1. Please provide a description of the following processes, the amount of raw material used, the amount and type of wastes generated and how the wastes were managed: etching, chemical milling; metal plating; degreasing; spray painting, chemical processing, photoprocessing and printed circuit board manufacturing.
2. Please provide all submitted Biennial (or Annual) Hazardous Waste Reports required by EPA or the State of California.
3. Please describe waste management processes prior to 1980. Please include specific information regarding:
 - Wastewater management prior to surface impoundment construction
 - Changes in waste management practices after the evaporation tanks were closed
 - Changes in waste management practices when the Hazardous Materials Processing Unit (HMPU) began operation
 - Waste management practices for cyanide wastes during the facility's history
 - Waste management practices for beryllium wastes during the facility's history.
4. Please identify the amount and types of wastes that are accepted at the Central Wastewater Treatment Plant (CWTP) from other portions of the facility. Specifically, identify which, if any, plating units historically or currently discharge plating wastes to locations other than the CWTP.
5. Provide a list of all air and water permits for the facility, including past permits. In addition, please provide information about air emission sources pertinent to hazardous waste containers and tanks (i.e., Title 40, Parts 264/265, Subparts AA, BB, and CC).
6. Please identify locations of all satellite accumulation areas, including the locations where wastewater treatment sludges, spent solvents, and any solvent heels from solvent recovery units have been

generated and accumulated.

7. Please identify the time frame during for which the solvent recovery units operated at the facility.
8. Please provide information about specific locations, regulatory status, and contents of the all waste tanks at the facility. Known waste tanks include:
 - Building 103 Hazardous Waste Tanks (WT103-2, WT103-3, and WT103-4) (SWMUs 103-4 and 103-5)
 - Building 170 Underground Beryllium Waste Tank (WT170-5) (SWMU 170-4)
 - Building 182 Hazardous Waste Tank (WT182-2) (SWMU 182-4)
 - Site 14E Former Waste Oil Tank (WT14E) (SWMU 14E/041-3).
9. Please provide the March 6, 1981 Interim Status Document issued by the California Department of Health and Services (DHS).
10. Please provide the DHS-certified closure plan for the evaporation ponds and any information pertaining to confirmatory sampling with regards to closure of these units.
11. Please provide a complete history of groundwater investigations at the facility.
12. Indicate whether the wells installed in the late 1960s were required by state, county, or city regulations.
13. Please provide information with regards to any off-site groundwater contamination, and information regarding the decision to install a groundwater extraction system in 1992, including which plume(s) the facility is attempting to contain with this system.
14. Please verify current or past existence of wastewater oxidation ponds

owned by the City of Sunnyvale to the north of the facility.

15. Please provide information regarding how much of the facility property is still owned by Lockheed, and whether any of the divested land is currently leased or operated by Lockheed.
16. Please provide the address of the U.S. Navy-owned 48-acre parcel.
17. Please provide information about which chemicals are used in the chemical processing areas and the types of chemical processing that takes place in these units.
18. Please provide a list of all sources of cooling towers and list current and past waste handling practices.
19. Please provide information about the types and quantities of any hazardous waste accepted from off site. Please include any information on state or federal waste codes associated with these wastes, date span during which the facility received the waste, and disposition of these waste streams.
20. Please provide information to assess the impact of facility's activities on the nearby wetland areas. In addition provide any evaluations that have been done with regards to facility impacts on endangered or threatened wildlife in the vicinity.
21. Please provide information about the types of paint used currently and historically at the facility.
22. Please describe any history of flooding at the facility.
23. Please describe solid waste generation.
24. Indicate if PCBs or other TSCA wastes were generated or managed at the facility.

25. Please describe use of radioactive materials and indicate if RCRA mixed waste is generated.
26. Please provide any information on contaminants in subsurface gas.
27. Indicate how much and what kind of waste was used in the cyanide destruction units, and why the facility chose to close the unit.
28. Please provide the following building-specific information for all buildings listed in the table below:
 - Dates of operation
 - Description/list of building activities
 - Description/list of wastes managed
 - Release controls
 - Release history and release potential to groundwater, soil, surface water, subsurface gas, and air.
29. For each SWMU or AOC listed below, please provide the following information:
 - Dates of operation
 - Description of unit (i.e., capacity and construction materials)
 - Description/list of wastes managed including waste codes
 - Release controls

- Release history and release potential to groundwater, soil, surface water, subsurface gas, and air.

SWMUs and AOCs by Building Location		
Report Section	Building No.	Identified SWMUs/AOCs
Not applicable (NA)	11C	No SWMUs or AOCs identified
6.2	14E/041	SWMU 14E/041-1: Former Spray Paint Booths (3) SWMU 14E/041-2: Former 14E Hazardous Waste Container Storage Area SWMU 14E/041-3: Former Underground Waste Oil Tank (WT14E)
6.3	071	SWMU 071-1: Plating Area (1) SWMU 071-2: Spray Paint Booths (4) SWMU 071-3: Degreaser (1) SWMU 071-4: Demineralizer SWMU 071-5: Hazardous Waste Tank (T-115) SWMU 071-6: Wastewater Tank (T-113) SWMU 071-7: Carbon Desorber
6.4	076	SWMU 076-1: Spray Paint Booth (1) SWMU 076-2: Degreaser (1)
NA	101	No SWMUs or AOCs identified
6.5	102	SWMU 102-1: Former Underground Vault
6.6	103	SWMU 103-1: Former Plating Area (1) SWMU 103-2: Former Degreasers (4) SWMU 103-3: Former Spray Paint Booth (1) SWMU 103-4: Former Plating Waste Tanks (WT103-1 and WT103-2) SWMU 103-5: Former Hazardous Waste Tanks (WT103-4 and RW103-5) SWMU 103-6: Former Waste Oil Tank (WO103-CO1) SWMU 103-7: Former Baker Tank
6.7	104	AOC 104-1: Soil Contamination Area 1 AOC 104-2: Soil Contamination Area 2

NA	105	No SWMUs or AOCs identified
NA	106	No SWMUs or AOCs identified
NA	107	No SWMUs or AOCs identified
6.8	109	SWMU 109-1: Waste Oil Tank 109 AOC 109-1: Former Underground Storage Tanks (4)
NA	110	No SWMUs or AOCs identified
NA	111	No SWMUs or AOCs identified
NA	112	No SWMUs or AOCs identified
6.9	113	SWMU 113-1: Degreasers (4) SWMU 113-2: Former Neutralization Unit SWMU 113-3: Hazardous Waste Tanks (WT113-1 and WT113-2)
6.10	114	SWMU 114-1: Andco Treatment Unit SWMU 114-2: Clarifier/Sludge Thickening Unit/Filter Press SWMU 114-3: Former HMPU SWMU 114-4: Former Cyanide Destruction Unit SWMU 114-5: Hazardous Waste Container Storage Area
NA	119	No SWMUs or AOCs identified
NA	123	No SWMUs or AOCs identified
NA	125	No SWMUs or AOCs identified
NA	128	No SWMUs or AOCs identified
NA	129	No SWMUs or AOCs identified
6.11	130	SWMU 130-1: Former Degreaser (1)
6.12	132	SWMU 132-1: Former Solvent Waste Drums
NA	133	No SWMUs or AOCs identified
NA	134	No SWMUs or AOCs identified
6.13	136	SWMU 136-1: Spray Paint Booth (1)
NA	137	No SWMUs or AOCs identified
6.14	138	SWMU 138-1: Former Steam Cleaning Unit
NA	139	No SWMUs or AOCs identified

6.15	140	SWMU 140-1: Spray Paint Booth (1) SWMU 140-2: Waste Coolant Tank (WO140-1)
6.16	141	SWMU 141-1: Spray Paint Booth (1)
NA	143	No SWMUs or AOCs identified
NA	145	No SWMUs or AOCs identified
NA	146	No SWMUs or AOCs identified
NA	147	No SWMUs or AOCs identified
NA	149	No SWMUs or AOCs identified
6.17	150	SWMU 150-1: Plating Area (1) SWMU 150-2: Spray Paint Booth (1) SWMU 150-3: Degreaser (1) SWMU 150-4: Former Waste Container Storage Area SWMU 150-5: Hazardous Waste Tanks (WT150-2 and WT150-3)
NA	150A	No SWMUs or AOCs identified
6.18	151	SWMU 151-1: Plating Area (1) SWMU 151-2: Spray Paint Booths (7) SWMU 151-3: Degreasers (11) SWMU 151-4: Hazardous Waste Tanks (RW151-1 and WT151-2) SWMU 151-5: Former Waste Chemical Storage Area
6.19	152	SWMU 152-1: Spray Paint Booths (2) SWMU 152-2: Hoist Sump
6.20	153	SWMU 153-1: Plating Area (1) SWMU 153-2: Spray Paint Booths (5) SWMU 153-3: Degreasers (7)
NA	154	No SWMUs or AOCs identified
6.21	155	SWMU 155-1: Spray Paint Booth (1)
NA	156	No SWMUs or AOCs identified
NA	157	No SWMUs or AOCs identified
NA	158	No SWMUs or AOCs identified
6.22	159	SWMU 159-1: Spray Paint Booth (1) SWMU 159-2: Hazardous Waste Tanks (WT159-8 and WT159-9) SWMU 159-3: Waste Oil Tank (WO159-4)

NA	160	No SWMUs or AOCs identified
NA	161	No SWMUs or AOCs identified
NA	162	No SWMUs or AOCs identified
NA	164	No SWMUs or AOCs identified
NA	165	No SWMUs or AOCs identified
6.23	166	AOC 166-1: Former Automotive Service Station
NA	168	No SWMUs or AOCs identified
6.24	170	SWMU 170-1: Former Plating Area (1) SWMU 170-2: Former Spray Paint Booths (4) SWMU 170-3: Former Degreasers (2) SWMU 170-4: Former Waste Beryllium Tank (WT170-5) SWMU 170-5: Former Bag House Dust Area SWMU 170-6: Former Process Clarifiers (2) and Underground Sumps (4) SWMU 170-7: Former Storm Ditch 002 SWMU 170-8: Former Waste Oil Tank (WO170-WO) SWMU 170-9: Former Hazardous Waste Tank (WT170-3)
6.25	171	SWMU 171-1: Incinerator
NA	172	No SWMUs or AOCs identified
NA	173	No SWMUs or AOCs identified
6.26	174	SWMU 174-1: Spray Paint Booths (6) SWMU 174-2: Demineralizer
NA	175	No SWMUs or AOCs identified
NA	177	No SWMUs or AOCs identified
NA	178	No SWMUs or AOCs identified
6.27	179	SWMU 179-1: Metal Wastewater Sump SWMU 179-2: Former Cyanide Destruction Unit SWMU 179-3: Baker Tank
NA	180	No SWMUs or AOCs identified
6.28	181	SWMU 181-1: Spray Paint Booth (1) SWMU 181-2: Silver Retention Sump
6.29	182	SWMU 182-1: Plating Area (1)

		SWMU 182-2: Spray Paint Booths (8) SWMU 182-3: Degreasers (5) SWMU 182-4: Hazardous Waste Tank (WT182-2) SWMU 182-5: Former Air Scrubbers SWMU 182-6: Acid Retention Sump SWMU 182-7: Metal Process Waste Sumps (3)
6.30	183	SWMU 183-1: Degreaser (1)
NA	184	No SWMUs or AOCs identified
NA	185	No SWMUs or AOCs identified
6.31	186	AOC 186-1: Leaded Gas UST
6.32	187	SWMU 187-1: Waste Oil Tank
6.33	188	SWMU 188-1: Former Spray Booth (1)
NA	189	No SWMUs or AOCs identified
NA	190	No SWMUs or AOCs identified
NA	191	No SWMUs or AOCs identified
NA	194	No SWMUs or AOCs identified
NA	195A	No SWMUs or AOCs identified
6.34	195B	SWMU 195B-1: Spray Booth (1) SWMU 195B-2: Degreaser (1)
NA	195D	No SWMUs or AOCs identified
NA	196	No SWMUs or AOCs identified
NA	528	No SWMUs or AOCs identified
NA	560	No SWMUs or AOCs identified
NA	561	No SWMUs or AOCs identified
6.35	562	SWMU 562-1: Former Degreaser (1) SWMU 562-2: Former Wastewater Treatment System SWMU 562-3: Former Hazardous Waste Tanks (WT562-1 and WT562-2)
NA	563	No SWMUs or AOCs identified
NA	564	No SWMUs or AOCs identified

NA	565	No SWMUs or AOCs identified
NA	566	No SWMUs or AOCs identified
NA	567	No SWMUs or AOCs identified
NA	571	No SWMUs or AOCs identified
NA	572	No SWMUs or AOCs identified
NA	573	No SWMUs or AOCs identified
NA	574	No SWMUs or AOCs identified
NA	575	No SWMUs or AOCs identified
NA	583	No SWMUs or AOCs identified
NA	588	No SWMUs or AOCs identified
NA	1001	No SWMUs or AOCs identified
NA	1002	No SWMUs or AOCs identified
NA	1004	No SWMUs or AOCs identified
NA	1005	No SWMUs or AOCs identified
NA	1006	No SWMUs or AOCs identified
NA	1007	No SWMUs or AOCs identified
NA	1008	No SWMUs or AOCs identified
NA	1009	No SWMUs or AOCs identified
NA	1010	No SWMUs or AOCs identified
NA	1013	No SWMUs or AOCs identified
NA	1016	No SWMUs or AOCs identified
NA	1018	No SWMUs or AOCs identified
NA	1023	No SWMUs or AOCs identified
NA	1024	No SWMUs or AOCs identified
NA	001 U.S. Air Force	No SWMUs or AOCs identified
6.36	Surface	SWMU Cluster-1: Evaporation Ponds

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	Impound- ment Cluster	SWMU Cluster-2: Holding Ponds
6.37	Storm Ditch 001	AOC 001-1: Storm Ditch 001
6.38	Waste Transfer Lines	AOC WTL: Waste Transfer Lines

APPENDIX C

GUIDANCE MANUAL FOR ELECTROPLATING AND METAL FINISHING PRETREATMENT STANDARDS

2. ELECTROPLATING CATEGORICAL PRETREATMENT STANDARDS (40 CFR PART 413)

2.1 AFFECTED INDUSTRY

The Electroplating Standards are applicable to wastewater from any or all of these six specific operations (See the Electroplating Final Development Document).

1. Electroplating
2. Electroless Plating
3. Anodizing
4. Coatings
5. Chemical Etching and Milling
6. Printed Circuit Board Manufacturing

These six electroplating operations are briefly discussed below:

1. Electroplating is the production of a thin surface coating of one metal upon another by electrodeposition. Ferrous or nonferrous basis materials may be coated by a variety of common (copper, nickel, lead, chromium, brass, bronze, zinc, tin, cadmium, iron, aluminum or combinations thereof) or precious (gold, silver, platinum, osmium, iridium, palladium, rhodium, indium, ruthenium, or combinations thereof) metals. In electroplating, metal ions supplied by the dissolution of metal from anodes or other pieces, are reduced on the work pieces (cathodes) while in either acid, alkaline, or neutral solutions.

The electroplating baths contain metal salts, alkalies, and other bath control compounds in addition to plating metals such as copper, nickel, silver or lead. Many plating solutions contain metallic, metallo-organic, and organic additives to induce grain refining, leveling of the plating surface, and deposit brightening.

2. Electroless Plating is the chemical deposition of a metal coating on a workpiece by immersion in an appropriate plating solution. Electricity is not involved, therefore uniform deposits are easily obtained. Copper and nickel electroless plating for printed circuit boards are the most common operations. In electroless nickel plating the source of nickel is a salt, and a reducer is used to reduce the nickel to its base state. A complexing agent is used to hold the metal ion in solution. Immersion plating, which for purposes of this

regulation is considered part of electroless plating, produces a metal deposit by chemical displacement; however, it is not an autocatalytic process but is promoted by one of the products of the reaction. Immersion plating baths are usually formulations of metal salts, alkalies and complexing agents (typically cyanide or ammonia).

3. Anodizing is an electrochemical process which converts the metal surface to a coating of an insoluble oxide. Aluminum is the most frequently anodized material. The formation of the oxide occurs when the parts are made anodic in dilute sulfuric or chromic acid solutions. The oxide layer begins formation at the extreme outer surface, and as the reaction proceeds, the oxide grows into the metal. Chromic acid anodic coatings are more protective than sulfuric acid coatings and are used if a complete rinsing of the part cannot be achieved.

Anodizing wastewater typically contains the basis material and either chromic or sulfuric acid. When dyeing of anodized coatings occurs, the wastewaters will contain chromium or other metals from the dye. Other potential pollutants include nickel acetate (used to seal anodic coatings) or other complexes and metals from dyes and sealers.

4. Coatings include chromating, phosphating, metal coloring and passivating. Pollutants associated with these processes enter the wastestream through rinsing and batch dumping of process baths. The process baths usually contain metal salts, acids, bases, and dissolved basis materials. In chromating, a portion of the base metal is converted to a component of the protective film formed by the coating solutions containing hexavalent chromium and active organic or inorganic compounds. Phosphate coatings are formed by the immersion of steel, iron, or zinc plated steel in a dilute solution of phosphoric acid plus other reagents to condition the surfaces for cold forming operations, prolong the life of organic coatings, provide good paint bonding and improve corrosion resistance. Metal coloring involves the chemical method of converting the metal surface into an oxide or similar metallic compound to produce a decorative finish. A variety of solutions utilizing many metals may contribute to the wastestream. Passivating is the process of forming a protective film on metals by immersion in an acid solution, usually nitric acid or nitric acid with sodium dichromate.
5. Etching and Chemical Milling are processes used to produce specific design configurations or surface appearances on parts by controlled dissolution with chemical reagents or etchants. Chemical etching is the same process as chemical milling except the rates and depths of metal removal are usually much greater in chemical milling. The major wastestream constituents are the dissolved basis material and etching solutions.
6. Printed Circuit Board Manufacturing involves the formation of a circuit pattern of conductive metal (usually copper) on nonconductive board materials such as plastic or glass. There are five basic steps

involved in the manufacturing of printed circuit boards: cleaning and surface preparation, catalyst and electroless plating, pattern printing and masking, electroplating, and etching.

Wastewater is produced in the manufacturing of printed circuit boards from the following processes:

- a. Surface preparation - The rinses following scrubbing, alkaline cleaning, acid cleaning, etchback, catalyst application, and activation.
- b. Electroless plating - Rinses following the electroless plating step.
- c. Pattern plating - Rinses following acid cleaning, alkaline cleaning, copper plating, and solder plating.
- d. Etching - Rinses following etching and solder brightening.
- e. Tab plating - Rinses following solder stripping, scrubbing, acid cleaning, and nickel, gold, or other plating operations.
- f. Immersion plating - Rinses following acid cleaning and immersion tin plating.

Additionally, water may be used for subsidiary purposes such as rinsing away spills, air scrubbing water, equipment washing, and dumping spent process solutions. The principal constituents of the wastestreams from the printed circuit board industry are suspended solids, copper, fluorides, phosphorus, tin, palladium, and chelating agents. Low pH values are characteristic of the wastes because of the necessary acid cleaning and surface pretreatment.

In addition to the above operations, the Electroplating Standards also apply to the related operations of alkaline cleaning, acid pickle, and stripping when each operation is followed by a rinse.

2.2 EXCEPTIONS FROM REGULATION COVERAGE

Operations similar to electroplating which are specifically exempt from coverage under the Electroplating Categorical Pretreatment Standards include:

1. Electrowinning and electrefining conducted as part of nonferrous metal smelting and refining (40 CFR Part 421);

TABLE 3.1. METAL FINISHING CATEGORY UNIT OPERATIONS

Unit Operations	Summary Description of Unit Operations
1. Electroplating	The production of a thin surface coating of one metal upon another by electrodeposition. Ferrous or nonferrous basis materials may be coated by a variety of common (copper, nickel, lead, chromium, brass, bronze, zinc, tin, cadmium, iron, aluminum or combinations thereof) or precious (gold, silver, platinum, osmium, iridium, palladium, rhodium, indium, ruthenium, or combinations thereof) metals. In electroplating, metal ions supplied by the dissolution of metal from anodes or other pieces, are reduced on the work pieces (cathodes) while in either acid, alkaline, or neutral solutions.
2. Electroless Plating	The chemical deposition of a metal coating on a workpiece by immersion in an appropriate plating solution in which electricity is not involved. Copper and nickel electroless plating for printed circuit boards are the most common operations. Immersion plating, which for purposes of the Metal Finishing regulation is considered part of electroless plating, produces a metal deposit by chemical displacement.
3. Anodizing	An electrochemical process which converts the metal surface to a coating of an insoluble oxide. Aluminum is the most frequently anodized material. The formation of the oxide occurs when the parts are made anodic in dilute sulfuric or chromic acid solutions. The oxide layer begins formation at the extreme outer surface, and as the reaction proceeds, the oxide grows into the metal.
4. Coatings,	Any operation that includes chromating, phosphating, metal coloring and passivating. In chromating, a portion of the base metal is converted to a component of the protective film formed by the coating solutions containing hexavalent chromium and active organic or inorganic compounds. Phosphate coatings are formed by the immersion of steel, iron, or zinc plated steel in a dilute solution of phosphoric acid plus other reagents to condition the surfaces for further processing. Metal coloring involves the chemical method of converting the metal surface into an

TABLE 3.1. METAL FINISHING CATEGORY UNIT OPERATIONS (Continued)

Unit Operations	Summary Description of Unit Operations
	oxide or similar metallic compound to produce a decorative finish. Passivating is the process of forming a protective film on metals by immersion in an acid solution, usually nitric acid or nitric acid with sodium dichromate.
5. Etching and Chemical Milling	These operations are used to produce specific design configurations or surface appearances on parts by controlled dissolution with chemical reagents or etchants. Chemical etching is the same process as chemical milling except the rates and depths of metal removal are usually much greater in chemical milling.
6. Printed Circuit Board Manufacturing	This operation involves the formation of a circuit pattern of conductive metal (usually copper) on nonconductive board materials such as plastic or glass. There are five basic steps involved in the manufacturing of printed circuit boards: cleaning and surface preparation, catalyst and electroless plating, pattern printing and masking, electroplating, and etching.
7. Cleaning	This operation involves the removal of oil, grease, and dirt from the basis material using water with or without detergents or other dispersing agents. Acid cleaning is a process in which an acid is used with a wetting agent or detergent to remove oil, grease, dirt, or oxide from the metal surface.
8. Machining	This operation involves the general process of removing stock from a workpiece by forcing a cutting tool through the workpiece, thereby removing a chip of basis material. Machining operations incorporate the use of natural and synthetic oils for cooling and lubrication.
9. Grinding	This operation involves the process of removing stock from a workpiece by the use of a tool consisting of abrasive grains held by a rigid or semi-rigid binder. Natural and synthetic oils are used for cooling and lubrication in many grinding operations.